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T-AND-COVER TUNNELING

Vol. 3. Summary Cost Analyses

December 1979
Final Report

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Springfield, Virginia 22161

Prepared for
FEDERAL HIGHWAY ADMINISTRATION
Offices of Research & Development
Washington, D. C. 20590

FOREWORD

This report, Volume 3, Summary Cost Analyses, provides backup cost data for evaluating alternate cut-and-cover tunnel construction systems. The details of the evaluation method are given in Volume 2, which is being distributed concurrently.

Volume 1 of the report was completed in 1976 and single copies were distributed to headquarters and field offices of the Federal Highway Administration and to State highway agencies. Volumes 2 and 3 and the Executive Summary are being given the same distribution. The Supplemental Volume, which contains the extensive cost data used in this study, is not being distributed. All volumes are available to the public through the National Technical Information Service.

Charles F. Scheffey
Director, Office of Research
Federal Highway Administration

NOTICE

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FHWA-
RD-
76-30

Technical Report Documentation Page

1. Report No. FHWA-RD-76-30,	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle CUT-AND-COVER TUNNELING, VOLUME 3 - SUMMARY COST ANALYSES		5. Report Date December 1979
		6. Performing Organization Code
7. Author(s) G. E. Wickham and H. R. Tiedemann		8. Performing Organization Report No. JA 166
9. Performing Organization Name and Address Jacobs Associates 500 Sansome Street San Francisco, CA 94111		10. Work Unit No. (TRAIS) FCP No. 35B1-052
		11. Contract or Grant No. DOT-FH-11-8513
12. Sponsoring Agency Name and Address Department of Transportation Federal Highway Administration, Office of Research and Development Washington, D.C. 20590		13. Type of Report and Period Covered Final Report July 1974 to June 1978
		14. Sponsoring Agency Code

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15. Supplementary Notes

Contract Manager for this study: J. R. Sallberg (HRS-11)

16. Abstract

This volume contains summary cost analyses for 15 of the 176 study situations. The analyses give the unit costs of all labor, equipment, and material resources required to complete each project and are typical of the 176 cost estimates prepared for this study.

The overall report "Cut-and-Cover Tunneling" includes additional volumes as follows:

Volume 1, Construction Methods, Design, and Activity Variations (FHWA-RD-76-28)

Volume 2, Cost Analysis and Systems Evaluation (FHWA-RD-76-29)

Supplemental Volume, Construction Cost Data, Four Basic Estimates (FHWA-RD-76-139)

Executive Summary (FHWA-RD-79-61)

17. Key Words Cut-and-Cover Tunneling Open-Trench, Inverted Ground Support Transit Structures	18. Distribution Statement No restrictions. This document is available to the public through the National Technical Information Service, Springfield, VA 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	242	

Form DOT F 1700.7 (8-72)

PREFACE

In June 1974, the U.S. Department of Transportation, Federal Highway Administration, authorized Jacobs Associates to undertake a study dealing with various aspects of cut-and-cover tunneling operations pertaining to highway and transit structures (Contract No. DOT-FH-11-8513, modified May 30, 1975). A report covering the first phase of the study entitled "Cut-and-Cover Tunneling, Volume 1: Construction Methods, Design and Activity Variations" was submitted in January 1976 and has been published as Report No. FHWA-RD-76-28.

Findings and results of the second and final phase, which dealt primarily with costs of construction and environmental disruptions, are presented in "Cut-and-Cover Tunneling, Volume 2: Cost Analysis and Systems Evaluation," published as Report No. FHWA-RD-76-29.

This volume is not presented as a separate or self-contained report, but rather as an appendix to Volume 2 for those individuals interested in detailed construction costs. It contains the summary cost analyses, in computer printout form, of fifteen construction cost estimates produced for this study.

The Supplemental Volume, Construction Cost Data, Four Basic Estimates, FHWA-RD-76-139, contains complete cost data for four study situations. This 732-page reference volume provides the basic data used for all estimate situations considered in the study.

VOLUME 3

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INTRODUCTION

This volume of a study entitled "Cut-and-Cover Tunneling" prepared for the Federal Highway Administration - U.S. Department of Transportation by Jacobs Associates contains summary analysis of construction costs for fifteen different cut-and-cover tunneling situations. These analyses are part of a series of 176 cost estimates prepared to show comparative evaluation of cost when considering three different transit structures, three methods of ground support, five site conditions, three depths and two methods of bracing. A comparison of cut-and-cover and inverted construction estimates are also included. Various combinations of the above conditions include most possibilities considered for future transit construction.

Volume 1, FHWA-RD-76-28, presents a detailed discussion of various aspects of cut-and-cover tunneling. It defines major construction activities and describes most effective means of accomplishment depending on method of construction. Volume 2, FHWA-RD-76-29, develops basic cost data for cut-and-cover construction and provides a method by which these data can be used to determine the construction cost of future transit structures. It also presents a rationale for making preliminary evaluations of the cost of disruption associated with cut-and-cover tunneling. The detailed cost information presented in this volume was developed during that phase of the study.

The first 12 summaries presented herein relate to cut-and-cover construction of a highway tunnel, a rapid transit station and a rapid transit line section. Three different methods of ground support; soldier piles and lagging, cast-in-place slurry walls (SPTC) and precast concrete diaphragm walls are considered for each structure. Three estimates for each structure are based on use of internal bracing, the fourth on the use of tieback bracing. All structures are built at a 70-foot (21.3m) invert depth. There are three at each of sites 1 and 3 and two at each of sites 2, 4 and 5. The soil and groundwater condition

at these sites is shown in the site cross section preceding each estimate summary. Total project cost is the sum shown for 15 basic activities; 11 being considered as direct cost, the other 4 as indirect and overhead costs. Each activity is broken into various individual work operations required for completion. Quantities of work as well as unit costs of labor, equipment operation, job materials and sub-contract costs are given for each operation which are then summarized to give total cost for the respective activity. Adding a contractors markup to the total project cost gives the anticipated bid price of the work. Markup for this study is assumed as 15%, but is not shown on the printout. Costs of the 15 basic activities and allowance for contractors markup for each of these and the remaining 164 estimates are summarized in Appendix C of Volume 2. All costs are based on mid-1974 prices within the Washington, D.C. area.

Volume 2 describes how the estimates were developed and provides a method by which operation or activity costs can be adjusted to reflect quantities and conditions for new construction situations. It illustrates by example how the planner can use cost detail such as contained in this volume to determine the cost of different alternatives for future work. By adding the cost of disruption, he can then make a decision as to the most effective construction to be used. A procedure for updating the estimate to a new year and location is also given.

The summary analyses are identified by an estimate code which defines the site, type of structure and construction condition. See page ix. The codes which are crosshatched correspond to the estimate summaries given in this volume. The last three summaries designated as 1-1LT, 1-4LT and 1-7LT provide a comparison of costs when using either the cut-and-cover method (1-1LT), inverted or under-the-roof method (1-4LT) or combination method (1-7LT) of constructing a highway tunnel section at a 30-foot (9.1m) depth with site 1 soil conditions. All three methods utilize precast panels and internal bracing. Cost data given for these three estimates can be used the same

as mentioned for other 12, all as described in Volume 2. The estimate designations 1-4LT and 1-7LT were arbitrarily assigned and therefore not shown on the tabulation of page ix. Summaries of activity costs and markup allowances for these three estimates are shown as Table 29, page 180, of Volume 2.

The cross section presented at the beginning of each summary shows the relationship of the underground structure (tunnel or station) to the construction site. The soil and groundwater conditions are also shown. For additional details including ground support and bracing see Section 1 of Volume 2.

The format of the computer printout is the same for all estimates. The construction situation and estimate designation code is shown at the top of each page. The four character code at the left hand side of each page identifies the structure construction and activity requirement as shown on Table 7, page 63, of Volume 2. The next number to the right denotes the various operations required for each activity. This is followed by a description of the operation as well as the quantity of work involved. Total and unit costs for all components (labor, equipment operation, etc.) are given across the page. The percent of total project cost (without contractors markup) - "PCTOT" - represented by each operation and activity is shown after the "Total Column." The activity and operation identification is repeated on the right hand side of the page.

The cost data provided in this volume is given primarily to illustrate the type of detail required to properly evaluate the construction cost of cut-and-cover tunneling. Although summaries included in Volume 2 are adequate to make reasonable cost estimates for many different situations, those requiring a more detailed analysis can do so by using data from this volume and following the procedures discussed in Volume 2.

Table 1. ESTIMATE CODES - 176 STUDY SITUATIONS

DEPTH		30 FEET						50 FEET						70 FEET					
GROUND SUPPORT		SOLDIER PILES & LAGGING		CAST-IN SLURRY CONCRETE		PRECAST CONCRETE PANELS		SOLDIER PILES & LAGGING		CAST-IN SLURRY CONCRETE		PRECAST CONCRETE PANELS		SOLDIER PILES & LAGGING		CAST-IN SLURRY CONCRETE		PRECAST CONCRETE PANELS	
BRACING		INT.	T.B.	INT.	T.B.	INT.	T.B.	INT.	T.B.	INT.	T.B.	INT.	T.B.	INT.	T.B.	INT.	T.B.	INT.	T.B.
FOUR LANE HIGHWAY TUNNEL	SITE 1	1-1GT	1-1HT	1-1JT	1-1KT	1-1LT	1-1MT	1-1GV	1-1HV	1-1JV	1-1KV	1-1LV	1-1MV	1-1GY	1-1HY	1-1JY	1-1KY	1-1LY	1-1MY
	SITE 2	2-1GU	2-1HU	2-1JU	2-1KU	2-1LU	2-1MU	2-1GW	2-1HW	2-1JW	2-1KW	2-1LW	2-1MW	2-1GZ	2-1HZ	2-1JZ	2-1KZ	2-1LZ	2-1MZ
	SITE 3	-	-	3-1JT	3-1KT	3-1LT	3-1MT	-	-	3-1JV	3-1KV	3-1LV	3-1MV	-	-	3-1JY	3-1KY	3-1LY	3-1MY
	SITE 4	-	-	4-1JT	4-1KT	4-1LT	4-1MT	-	-	4-1JV	4-1KV	4-1LV	4-1MV	-	-	4-1JY	4-1KY	4-1LY	4-1MY
	SITE 5	-	-	5-1JT	-	5-1LT	-	-	-	5-1JV	-	5-1LV	-	-	-	5-1JY	-	5-1LY	-
RAPID TRANSIT STATION	SITE 1	-	-	-	-	-	-	1-2GV	1-2HV	1-2JV	1-2KV	1-2LV	1-2MV	1-2GY	1-2HY	1-2JY	1-2KY	1-2LY	1-2MY
	SITE 2	-	-	-	-	-	-	2-2GW	2-2HW	2-2JW	2-2KW	2-2LW	2-2MW	2-2GZ	2-2HZ	2-2JZ	2-2KZ	2-2LZ	2-2MZ
	SITE 3	-	-	-	-	-	-	-	-	3-2JV	3-2KV	3-2LV	3-2MV	-	-	3-2JY	3-2KY	3-2LY	3-2MY
	SITE 4	-	-	-	-	-	-	-	-	4-2JV	4-2KV	4-2LV	4-2MV	-	-	4-2JY	4-2KY	4-2LY	4-2MY
	SITE 5	-	-	-	-	-	-	-	-	5-2JV	-	5-2LV	-	-	-	5-2JY	-	5-2LY	-
RAPID TRANSIT LINE SECTION	SITE 1	1-3GT	1-3HT	1-3JT	1-3KT	1-3LT	1-3MT	1-3GV	1-3HV	1-3JV	1-3KV	1-3LV	1-3MV	1-3GY	1-3HY	1-3JY	1-3KY	1-3LY	1-3MY
	SITE 2	2-3GU	2-3HU	2-3JU	2-3KY	2-3LY	2-3MU	2-3GW	2-3HW	2-3JW	2-3KW	2-3LW	2-3MW	2-3GZ	2-3HZ	2-3JZ	2-3KZ	2-3LZ	2-3MZ
	SITE 3	-	-	3-3JT	3-3KT	3-3LT	3-3MT	-	-	3-3JV	3-3KV	3-3LV	3-3MV	-	-	3-3JY	3-3KY	3-3LY	3-3MY
	SITE 4	-	-	4-3JT	4-3KT	4-3LT	4-3MT	-	-	4-3JV	4-3KV	4-3LV	4-3MV	-	-	4-3JY	4-3KY	4-3LY	4-3MY
	SITE 5	-	-	5-3JT	-	5-3LT	-	-	-	5-3JV	-	5-3LV	-	-	-	5-3JY	-	5-3LY	-

Shaded areas represent estimates summarized in this volume.

Table 2. ESTIMATE CODE DESIGNATIONS

FIRST CHARACTER - Site Condition

1 - Site 1
2 - Site 2
3 - Site 3
4 - Site 4
5 - Site 5

SECOND CHARACTER - Type of Structure

1 - Four Lane Highway
2 - Rapid Transit Station
3 - Rapid Transit Line Section

THIRD CHARACTER - Ground Support & Bracing Method

G - Soldier Piles & Lagging - Internal Bracing
H - Soldier Piles & Lagging - Tieback Bracing
J - SPTC Wall - Internal Bracing
K - SPTC Wall - Tieback Bracing
L - Precast Panel Wall - Internal Bracing
M - Precast Panel Wall - Tieback Bracing

FOURTH CHARACTER - Depth of Excavation - Soil Condition

T - 30 ft Depth - High Water Table
U - 30 ft Depth - Low Water Table
V - 50 ft Depth - High Water Table
W - 50 ft Depth - Low Water Table
Y - 70 ft Depth - High Water Table
Z - 70 ft Depth - Low Water Table

Table 3. ACTIVITY CODE DESIGNATIONS

FIRST CHARACTER - TYPE OF STRUCTURE

1. FOUR LANE HIGHWAY TUNNEL
2. RAPID TRANSIT STATION
3. TWIN BOX RAPID TRANSIT TUNNEL

SECOND CHARACTER - MAJOR ESTIMATE ACTIVITY

A. CONTROL TRAFFIC
B. UTILITY WORK
C. PROJECT ADJACENT STRUCTURES
D. CONTROL GROUND WATER
E. DECKING
F. GROUND WALL SUPPORT
G. BRACING
H. EXCAVATION
I. CONSTRUCT PERMANENT STRUCTURE
J. BACKFILL
K. RESTORATION

N. OVERHEAD (FIXED COSTS)
O. OVERHEAD (TIME RELATED COSTS)
P. PLANT (FIXED COSTS)
Q. PLANT (TIME RELATED COSTS)

THIRD CHARACTER - TYPE OF WALL AND/OR BRACING

A. SOLDIER PILE AND LAGGING WALL ONLY
B. S.P.T.C. WALL ONLY
C. PRECAST WALL ONLY

D. DIAPHRAGM WALL - IE, S.P.T.C. OR PRECAST WALL

E. INTERNAL BRACING ONLY
F. TIEBACK BRACING ONLY

G. SOLDIER PILE AND LAGGING WALL WITH INTERNAL BRACING
H. SOLDIER PILE AND LAGGING WALL WITH TIEBACK BRACING

J. S.P.T.C. WALL WITH INTERNAL BRACING
K. S.P.T.C. WALL WITH TIEBACK BRACING

L. PRECAST WALL WITH INTERNAL BRACING
M. PRECAST WALL WITH TIEBACK BRACING

FOURTH CHARACTER - DEPTH OF EXCAVATION AND/OR WET OR DRY SOIL CONDITION

N. 30 FT DEPTH ONLY
P. 50 FT DEPTH ONLY
Q. 70 FT DEPTH ONLY

R. WET CONDITION ONLY
S. DRY CONDITION ONLY

T. 30 FT DEPTH WITH HIGH WATER TABLE
U. 30 FT DEPTH WITH LOW WATER TABLE

V. 50 FT DEPTH WITH HIGH WATER TABLE
W. 50 FT DEPTH WITH LOW WATER TABLE

Y. 70 FT DEPTH WITH HIGH WATER TABLE
Z. 70 FT DEPTH WITH LOW WATER TABLE

NOTE: IN THE THIRD AND FOURTH CHARACTER WHERE NO VARIABLE CONDITION APPLIES A "0" (ZERO) WILL BE USED.

METRIC CONVERSION FACTORS

For Tables, Figures and Estimate Quantities

1"	=	1 in.	=	25.4 mm
1'	=	1 ft.	=	0.305 m
1 SF	=	1 sq. ft.	=	0.0929 m^2
1 SY	=	1 sq. yd.	=	0.836 m^2
1 MSF	=	1000 sq. ft.	=	92.9 m^2
1 CF	=	1 cu. ft.	=	0.0283 m^3
1 CY	=	1 cu. yd.	=	0.765 m^3
1 MBF	=	1000 bd. ft.	=	2.36 m^3
1 LB	=	1 lb.	=	0.454 kg
1 T	=	1 ton	=	907 kg
1 BAG (94 lb.)			=	42.6 kg
1 BAG (100 lb.)			=	45.4 kg
1 GAL	=	1 gallon	=	3.79 litres
1 CFM	=	1 cu. ft./min.	=	0.000472 m^3/s
1 HP	=	1 hp	=	746 W

SUMMARY ANALYSIS

OF

ESTIMATE DOT 2-1GZ

FOUR LANE HIGHWAY TUNNEL

SITE 2 - 70' DEPTH

SOLDIER PILE & LAGGING GROUND SUPPORT

INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

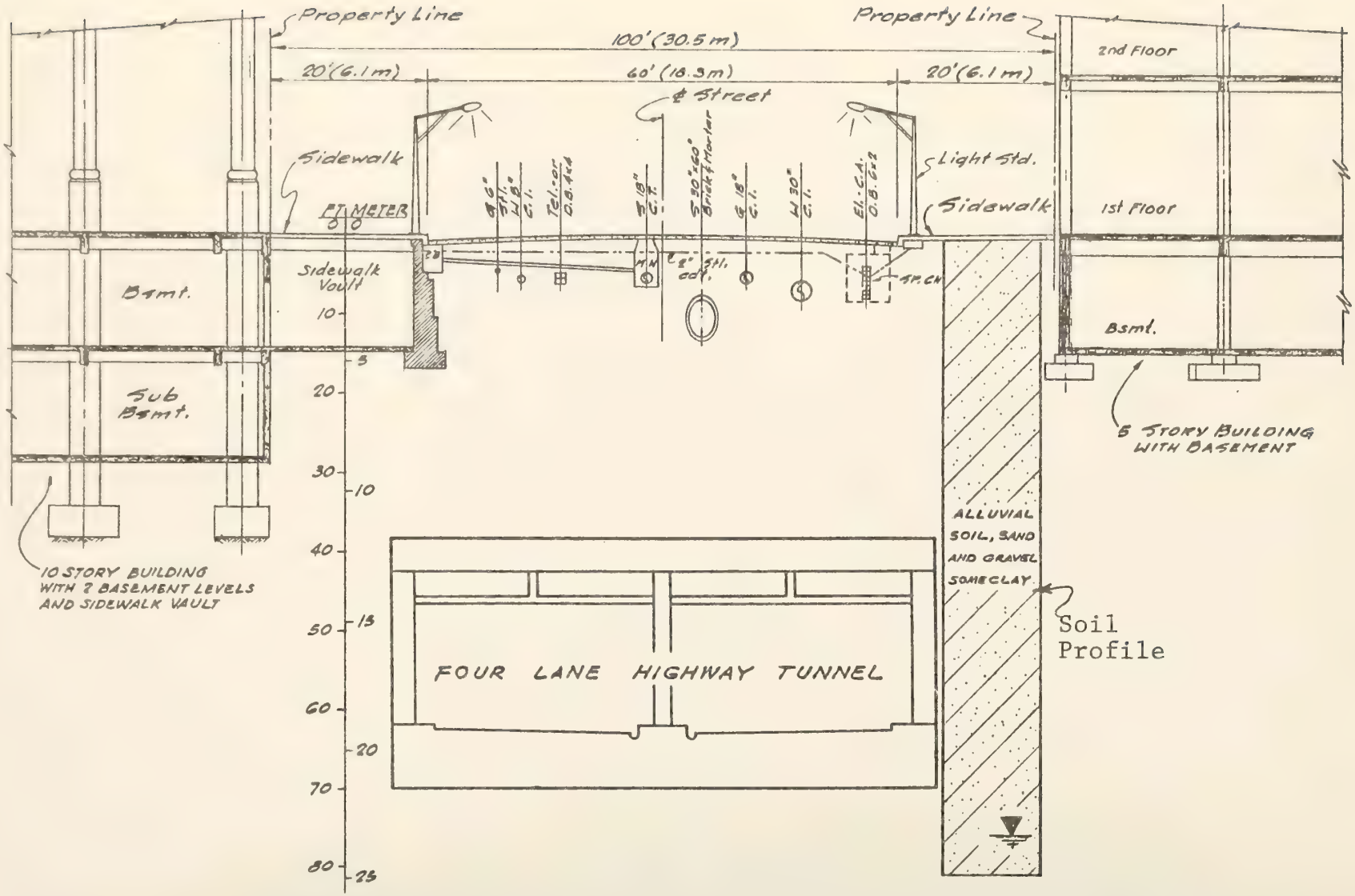


Figure 1. PROJECT 2-1GZ - HIGHWAY TUNNEL
SITE 2 - 70' DEPTH
SOLDIER PILES & LAGGING - INTERNAL BRACING

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	10196734	2053493	7102639	5043367	1772012	26168245	100.000
PROJECT						26168245	100.000

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

			TOTAL COST ANALYSIS			PROJECT SUMMARY				
			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1A00	1	CONST.BARRICADES ETC.	42253	1166	37713			81132	.310	1A00 1
		45 DA	938.956	25.911	838.067			1802.933		
1A00	2	SET&MOVE BARRICADES ET	28807	2718	5271			36796	.141	1A00 2
		45 DA	640.156	60.400	117.133			817.689		
1A00	3	FLAGMEN-DIRECT TRAFFIC	46416		3249			49665	.190	1A00 3
		300 DA	154.720		10.830			165.550		
1A00	ITEM	CONTROL TRAFFIC	117476	3884	46233			167593	.640	1A00 ITEM
1BA1	1	ALL OPERATIONS	198151	18680	199450	8000	1219044	1643325	6.280	1BA1 1
1BA1	ITEM	UTILITY WORK-ALTERNATE	198151	18680	199450	8000	1219044	1643325	6.280	1BA1 ITEM
1CAQ	1	GENL EXTERIOR PROTECT	21501	6955	7550			36006	.138	1CAQ 1
		40 DA	537.525	173.875	188.750			900.150		
1CAQ	2	SIDEWALK VAULTS &WALLS	94179	18024	21703	22979		156885	.600	1CAQ 2
		1000 LF	94.179	18.024	21.703	22.979		156.885		
1CAQ	3	CONTROL PIERS	78945	8135	37725			124805	.477	1CAQ 3
		50 EA	1578.900	162.700	754.500			2496.100		
1CAQ	6	UNDERPIN-PREP FTGS&CON	299676	32276	125443			457395	1.748	1CAQ 6
		50 EA	5993.520	645.520	2508.860			9147.900		
1CAQ	7	UNDERPIN-JACK PILES	629760	2745	123962			756467	2.891	1CAQ 7
		300 EA	2099.200	9.150	413.207			2521.557		

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1CAQ	8	UNDERPIN-PREP FTGS&CON	299676	32276	125443			457395	1.748	1CAQ 8
		50 EA	5993.520	645.520	2508.860			9147.900		
1CAQ	9	UNDERPIN-JACK PILES	472320	2059	169204			643583	2.459	1CAQ 9
		300 EA	1574.400	6.863	564.013			2145.277		
1CAQ	ITEM	PROTECT ADJ STRUCTURES	1896057	102470	611030	22979		2632536	10.060	1CAQ ITEM
1E00	1	CENTER PILE EXPL HOLE	14847	2083	4339			21269	.081	1E00 1
		168 EA	88.375	12.399	25.827			126.601		
1E00	2	DRILL HOLES-CENTR PILE	56098	66441	3927			126466	.483	1E00 2
		168 EA	333.917	395.482	23.375			752.774		
1E00	4	SPLICE,PLACE,TRIM,PILE	34065	12555	135925			182545	.698	1E00 4
		168 EA	202.768	74.732	809.077			1086.577		
1E00	5	BACKFILL PILE HOLES	14776	3706	16453			34935	.134	1E00 5
		168 EA	87.952	22.060	97.935			207.946		
1E00	6	PILE CAPS,WALES,DECKBM	236392	51787	1016547			1304726	4.986	1E00 6
		2000 TON	118.196	25.894	508.274			652.363		
1E00	7	LATERAL & SWAY BRACING	77158	13850	110401			201409	.770	1E00 7
		150 TON	514.387	92.333	736.007			1342.727		
1E00	8	DECK MATS & TIMBERS	75258	5558	580808			661624	2.528	1E00 8
		16444 SY	4.577	.338	35.320			40.235		
1E00	9	REPOST DECK SUPPORT	81144	25140	18280			124564	.476	1E00 9
		168 EA	483.000	149.643	108.810			741.452		

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1E00 11	REMOVE TIMBER DECKING	37504	5794	2625			45923	.175	1E00 11
	16444 SY	2.281	.352	.160			2.793		
1E00 12	RMV.DECK BMS.&INT.PILE	87621	37445	6133			131199	.501	1E00 12
	1982 TON	44.208	18.893	3.094			66.195		
1E00 13	REMOVE WALES & CAPS	34091	14569	2386			51046	.195	1E00 13
	482 TON	70.728	30.226	4.950			105.905		
1E00 14	REM.LAG.&PILES TO -6	31831	8611	2228			42670	.163	1E00 14
	4000 LF	7.958	2.153	.557			10.668		
1E00 ITEM	STREET DECKING	780785	247539	1900052			2928376	11.191	1E00 ITEM
	16444 SY	47.481	15.053	115.547			178.082		
1FAQ 1	TRENCH FOR SOLD PILES	88368	12400	10586			111354	.426	1FAQ 1
	4000 LF	22.092	3.100	2.647			27.839		
1FAQ 2	DRILL HOLES FOR PILES	85569	101347	20340			207256	.792	1FAQ 2
	41000 LF	2.087	2.472	.496			5.055		
1FAQ 3	SPLICE,PLACE,TRIM PILE	101382	37365	746297			885044	3.382	1FAQ 3
	500 EA	202.764	74.730	1492.594			1770.088		
1FAQ 4	BACKFILL PILE HOLES	32981	8273	48839			90093	.344	1FAQ 4
	500 EA	65.962	16.546	97.678			180.186		
1FAQ 5	PLACE LAGGING	336999	30913	252390			620302	2.370	1FAQ 5
	280000 SF	1.204	.110	.901			2.215		
1FAQ ITEM	GROUND SUPPORT WALL	645299	190298	1078452			1914049	7.314	1FAQ ITEM
	31111 SY	20.742	6.117	34.665			61.523		

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1GEQ 1	SET BRACING LEVEL NO 2	93290	27213	532030			652533	2.494	1GEQ 1
	1051 TON	88.763	25.892	506.213			620.869		
1GEQ 2	PRESTRESS LEVEL NO 2	21489	501	1504			23494	.090	1GEQ 2
	1051 TON	20.446	.477	1.431			22.354		
1GEQ 3	SET BRACING LEVEL NO 3	97316	28387	577812			703515	2.688	1GEQ 3
	1142 TON	85.215	24.857	505.965			616.038		
1GEQ 4	PRESTRESS LEVEL NO 3	22416	523	1569			24508	.094	1GEQ 4
	1142 TON	19.629	.458	1.374			21.461		
1GEQ 5	SET BRACING LEVEL NO 4	73989	21582	387179			482750	1.845	1GEQ 5
	764 TON	96.844	28.249	506.779			631.872		
1GEQ 6	PRESTRESS LEVEL NO 4	17043	397	1193			18633	.071	1GEQ 6
	764 TON	22.308	.520	1.562			24.389		
1GEQ 7	SET BRACING LEVEL NO 5	67320	19637	320712			407669	1.558	1GEQ 7
	632 TON	106.519	31.071	507.456			645.046		
1GEQ 8	PRESTRESS LEVEL NO 5	15506	362	1085			16953	.065	1GEQ 8
	632 TON	24.535	.573	1.717			26.824		
1GEQ 11	REMOVE BRACING LEVEL 5	21920	9207	1534			32661	.125	1GEQ 11
	632 TON	34.684	14.568	2.427			51.679		
1GEQ 12	REMOVE BRACING LEVEL 4	26499	11129	1855			39483	.151	1GEQ 12
	764 TON	34.685	14.567	2.428			51.679		
1GEQ 13	REMOVE BRACING LEVEL 3	39608	16635	2773			59016	.226	1GEQ 13
	1142 TON	34.683	14.567	2.428			51.678		

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1GEQ 14	REMOVE BRACING LEVEL 2	36446	15307	2551			54304	.208	1GEQ 14
	1051 TON	34.677	14.564	2.427			51.669		
1GEQ ITEM	INTERNAL BRACING	532842	150880	1831797			2515519	9.613	1GEQ ITEM
	3589 TON	148.465	42.040	510.392			700.897		
1HEQ 1	BREAK PAVEMENT & HAUL	35921	14949	2514			53384	.204	1HEQ 1
	15300 SY	2.348	.977	.164			3.489		
1HEQ 2	EXCAVATE FIRST 5 FT	138150	66739	9671			214560	.820	1HEQ 2
	25600 CY	5.396	2.607	.378			8.381		
1HEQ 3	EXCAVATE 5 TO 22 FT	221074	166139	15475			402688	1.539	1HEQ 3
	86900 CY	2.544	1.912	.178			4.634		
1HEQ 4	EXCAVATE 22 TO 30 FT	100627	108500	7044			216171	.826	1HEQ 4
	40900 CY	2.460	2.653	.172			5.285		
1HEQ 5	EXCAVATE 30 TO 50 FT	217506	276340	15225			509071	1.945	1HEQ 5
	102200 CY	2.128	2.704	.149			4.981		
1HEQ 6	EXCAVATE 50 TO 70 FT	241682	307057	16918			565657	2.162	1HEQ 6
	102200 CY	2.365	3.004	.166			5.535		
1HEQ 7	FINE GRADE INVERT	65771	30166	4604			100541	.384	1HEQ 7
	15300 SY	4.299	1.972	.301			6.571		
1HEQ ITEM	EXCAVATION	1020731	969890	71451			2062072	7.880	1HEQ ITEM
	357800 CY	2.853	2.711	.200			5.763		

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1IAR 1	LEVELING SLAB FORMS	11966		3988			15954	.061	1IAR 1
	20 EA	598.300		199.400			797.700		
1IAR 2	POUR LEVELING SLAB	27040	2762	1893	49029		80724	.308	1IAR 2
	1640 CY	16.488	1.684	1.154	29.896		49.222		
1IAR 3	BASE SLAB REBAR,	371374	26562	25996	1010520		1434452	5.482	1IAR 3
	2406 TON	154.353	11.040	10.805	420.000		596.198		
1IAR 4	BASE SLAB BLKHDS&WK.FM	119664		13127			132791	.507	1IAR 4
	19340 SF	6.187		.679			6.866		
1IAR 5	BASE SLAB-POUR,CLEANUP	135204	13808	9464	968072		1126548	4.305	1IAR 5
	32080 CY	4.215	.430	.295	30.177		35.117		
1IAR 9	ASSEM.STL.WL&RF&PL FRM	21406	1947	164618			187971	.718	1IAR 9
	20 DA	1070.300	97.350	8230.900			9398.550		
1IAR 11	WALL REBAR	161232	9990	11286	310380		492888	1.884	1IAR 11
	739 TON	218.176	13.518	15.272	420.000		666.966		
1IAR 12	MOVE & SET STEEL FORMS	423539		42198			465737	1.780	1IAR 12
	2000 LF	211.770		21.099			232.869		
1IAR 13	ROOF SLAB REBAR	358727	22227	25111	634200		1040265	3.975	1IAR 13
	1510 TON	237.568	14.720	16.630	420.000		688.917		
1IAR 14	POUR WALLS & ROOF SLAB	155310	15861	10872	904784		1086827	4.153	1IAR 14
	29980 CY	5.180	.529	.363	30.180		36.252		
1IAR 15	PLACE ROOF WATERPROOF					156825	156825	.599	1IAR 15
	15300 SY					10.250	10.250		

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1IAR 16	MORTAR PROT.FOR W.P.	25707	3691	3479	65092		97969	.374	1IAR 16
	1680 CY	15.302	2.197	2.071	38.745		58.315		
1IAR 17	FORM PLENUM DECK	81576		8380			89956	.344	1IAR 17
	2000 LF	40.788		4.190			44.978		
1IAR 18	PLEN.DECK REBAR	60160	2650	4211	76800		143821	.550	1IAR 18
	240 TON	250.667	11.042	17.546	320.000		599.254		
1IAR 19	POUR PLENUM DECK	55226	9466	3866	99674		168232	.643	1IAR 19
	3000 CY	18.409	3.155	1.289	33.225		56.077		
1IAR 20	CONST.PLENUM DIV. WALL	20218	1261	2105	12250		35834	.137	1IAR 20
	200 CY	101.090	6.305	10.525	61.250		179.170		
1IAR 21	ELECTRICAL EMBEDDED					230000	230000	.879	1IAR 21
1IAR 22	MECHANICAL EMBEDDED					105000	105000	.401	1IAR 22
1IAR 23	PATCH&POINT CONC.WORK	84847		5939	4900		95686	.366	1IAR 23
	416000 SF	.204		.014	.012		.230		
1IAR 24	CLEAN UP STRUCTURE	11829	662	828			13319	.051	1IAR 24
	20 DA	591.450	33.100	41.400			665.950		
1IAR ITEM	CONSTRUCT PERM.STRUCT.	2125025	110887	337361	4135701	491825	7200799	27.517	1IAR ITEM
	66900 CY	31.764	1.658	5.043	61.819	7.352	107.635		
1JEQ 1	BACKFILL & TAMP 2 FT	59773	2656	4184	40800		107413	.410	1JEQ 1
	10200 CY	5.860	.260	.410	4.000		10.531		

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1JEQ 2	BACKFILL & TAMP 2-22FT	230586	28643	16141	408800		684170	2.615	1JEQ 2
	102200 CY	2.256	.280	.158	4.000		6.694		
1JEQ 3	BACKFILL & TMP 22-41FT	108694	13501	7609	224800		354604	1.355	1JEQ 3
	56200 CY	1.934	.240	.135	4.000		6.310		
1JEQ 4	BACKFILL & TMP.TOP 5FT	173282	21524	12130	102400		309336	1.182	1JEQ 4
	25600 CY	6.769	.841	.474	4.000		12.083		
1JEQ ITEM	BACKFILL	572335	66324	40064	776800		1455523	5.562	1JEQ ITEM
	194200 CY	2.947	.342	.206	4.000		7.495		
1K00 1	PLACE 6IN SUBGRADE	13803	3800	966	16700		35269	.135	1K00 1
	13350 SY	1.034	.285	.072	1.251		2.642		
1K00 2	PLACE 4IN BASE COURSE	13803	3800	966	10680		29249	.112	1K00 2
	13350 SY	1.034	.285	.072	.800		2.191		
1K00 3	STREET PAVING					42343	42343	.162	1K00 3
	13350 SY					3.172	3.172		
1K00 5	BREAKOUT REM. SIDEWALK	13763	5736	965			20484	.078	1K00 5
	5870 SY	2.348	.977	.164			3.490		
1K00 6	BF&TMP.SIDEWALK VAULTS	66686	8283	4668	40000		119637	.457	1K00 6
	9852 CY	6.769	.841	.474	4.060		12.143		
1K00 7	PLACE 4IN SIDEWK.SUBGR	13416	3693	939	5200		23248	.089	1K00 7
	7785 SY	1.723	.474	.121	.668		2.986		

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1K00 8	PLACE 4IN CONC.SIDEWLK	45719		4340	27307		77366	.296	1K00 8
	7785 SY	5.873		.557	3.508		9.938		
1K00 9	ACCESS WALKWAY	18663	1325	5554			25542	.098	1K00 9
	40 DA	466.575	33.125	138.850			638.550		
1K00 ITEM	STREET RESTORATION	185873	26637	18398	99887	42343	373138	1.426	1K00 ITEM
	13350 SY	13.923	1.995	1.378	7.482	3.172	27.950		
1N00 1	FIXED EXPENSE	67200	30000	217704			314904	1.203	1N00 1
1N00 ITEM	OVERHEAD-FIXED COSTS	67200	30000	217704			314904	1.203	1N00 ITEM
10GQ 1	OVERHEAD LABOR	1066200		74634			1140834	4.360	10GQ 1
	34 MO	31358.824		2195.118			33553.941		
10GQ 2	OVERHEAD EXPENSES			358700			358700	1.371	10GQ 2
	34 MO			10550.000			10550.000		
10GQ 3	GENERAL SERVICE CREW	906000	77004	63420			1046424	3.999	10GQ 3
	600 DA	1510.000	128.340	105.700			1744.040		
10GQ 4	VEHICLE OPERATION		34000				34000	.130	10GQ 4
	34 MO		1000.000				1000.000		
10GQ ITEM	OVERHEAD-TIME RELATED	1972200	111004	496754			2579958	9.859	10GQ ITEM
	34 MO	58005.882	3264.824	14610.412			75881.118		

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1P00	1	FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	.789	1P00 1
1P00	ITEM	PLANT-FIXED COSTS	82760	25000	79793		18800	206353	.789	1P00 ITEM
1QGQ	1	TIME RELATED COSTS			174100			174100	.665	1QGQ 1
		34 MO			5120.588			5120.588		
1QGQ	ITEM	PLANT-TIME RELATED			174100			174100	.665	1QGQ ITEM
		34 MO			5120.588			5120.588		

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	10196734	2053493	7102639	5043367	1772012	26168245	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 5-1JY

FOUR LANE HIGHWAY TUNNEL
SITE 5 - 70' DEPTH
CAST-IN-SLURRY CONCRETE (SPTC) GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

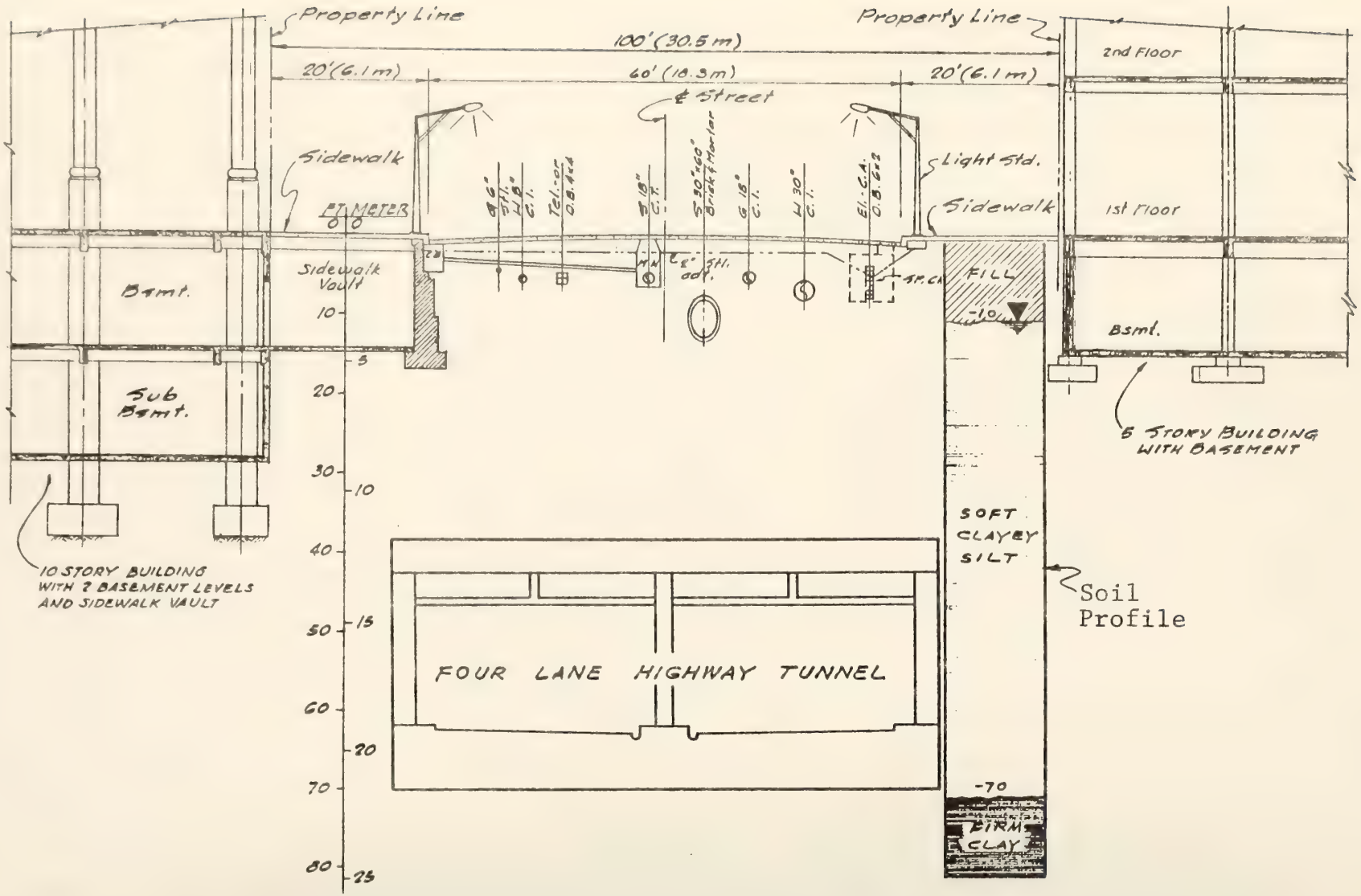


Figure 2. PROJECT 5-1JY - HIGHWAY TUNNEL
SITE 5 - 70' DEPTH
CAST-IN-SLURRY (SPTC) - INTERNAL BRACING

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 5-1JY

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	9684999	2636244	11112385	4906886	2263455	30603969	100.000
PROJECT						30603969	100.000

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 5-1JY

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1A00	1	CONST.BARRICADES ETC.	42253	1166	37713			81132	.265	1A00 1
		45 DA	938.956	25.911	838.067			1802.933		
1A00	2	SET&MOVE BARRICADES ET	28807	2718	5271			36796	.120	1A00 2
		45 DA	640.156	60.400	117.133			817.689		
1A00	3	FLAGMEN-DIRECT TRAFFIC	51058		3574			54632	.179	1A00 3
		330 DA	154.721		10.830			165.552		
1A00	ITEM	CONTROL TRAFFIC	122118	3884	46558			172560	.564	1A00 ITEM
1BD1	1	ALL OPERATIONS	198151	18680	199450	8000	1719712	2143993	7.006	1BD1 1
1BD1	ITEM	UTILITY WORK-ALTERNATE	198151	18680	199450	8000	1719712	2143993	7.006	1BD1 ITEM
1CD0	1	GENL EXTERIOR PROTECT	21501	6955	7550			36006	.118	1CD0 1
		40 DA	537.525	173.875	188.750			900.150		
1CD0	2	SIDEWALK VAULTS &WALLS	94179	18024	21703	22979		156885	.513	1CD0 2
		1000 LF	94.179	18.024	21.703	22.979		156.885		
1CD0	ITEM	PROTECT ADJ STRUCTURES	115680	24979	29253	22979		192891	.630	1CD0 ITEM
1DDY	1	TRENCH & SUMP-EXCAV.	109191	22352	45143			176686	.577	1DDY 1
		220 DAY	496.323	101.600	205.195			803.118		
1DDY	2	CONSTR INVERT SUMPS	8130	1259	982			10371	.034	1DDY 2
		3 EA	2710.000	419.667	327.333			3457.000		

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 5-1JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1DDY 3	PUMPING FROM SUMPS	182875	41132	12801			236808	.774	1DDY 3
	380 DAY	481.250	108.242	33.687			623.179		
1DDY ITEM	CONTROL GROUNDWATER	300196	64743	58926			423865	1.385	1DDY ITEM
1E00 1	CENTER PILE EXPL HOLE	14847	2083	4339			21269	.069	1E00 1
	168 EA	88.375	12.399	25.827			126.601		
1E00 2	DRILL HOLES-CENTR PILE	56098	66441	3927			126466	.413	1E00 2
	168 EA	333.917	395.482	23.375			752.774		
1E00 3	OPERATE SLURRY EQUIP	36657	8279	5629			50565	.165	1E00 3
	84 SH	436.393	98.560	67.012			601.964		
1E00 4	SPLICE,PLACE,TRIM,PILE	34065	12555	135925			182545	.596	1E00 4
	168 EA	202.768	74.732	809.077			1086.577		
1E00 5	BACKFILL PILE HOLES	14776	3706	16453			34935	.114	1E00 5
	168 EA	87.952	22.060	97.935			207.946		
1E00 6	PILE CAPS,WALES,DECKBM	230123	50414	989609			1270146	4.150	1E00 6
	1947 TON	118.194	25.893	508.274			652.361		
1E00 7	LATERAL & SWAY BRACING	77158	13850	110401			201409	.658	1E00 7
	150 TON	514.387	92.333	736.007			1342.727		
1E00 8	DECK MATS & TIMBERS	64961	4797	572317			642075	2.098	1E00 8
	16222 SY	4.005	.296	35.280			39.581		
1E00 9	REPOST DECK SUPPORT	81144	25140	18280			124564	.407	1E00 9
	168 EA	483.000	149.643	108.810			741.452		

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 5-1JY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1E00 11	REMOVE TIMBER DECKING	36228	5596	2536			44360	.145	1E00 11
	16222 SY	2.233	.345	.156			2.735		
1E00 12	RMV.DECK BMS.&INT.PILE	84002	35899	5880			125781	.411	1E00 12
	1900 TON	44.212	18.894	3.095			66.201		
1E00 13	REMOVE WALES & CAPS	31832	13603	2228			47663	.156	1E00 13
	450 TON	70.738	30.229	4.951			105.918		
1E00 14	REM.LAG.&PILES TO -6	31831	8611	2228			42670	.139	1E00 14
	4000 LF	7.958	2.153	.557			10.668		
1E00 ITEM	STREET DECKING	793722	250974	1869752			2914448	9.523	1E00 ITEM
	16222 SY	48.929	15.471	115.260			179.660		
1FBY 1	MOB.SLURRY PLT.&EQUIP.	17083	30490	1196			48769	.159	1FBY 1
	30 DA	569.433	1016.333	39.867			1625.633		
1FBY 2	TRENCH @ WALL LOCATION	88368	12400	10586			111354	.364	1FBY 2
	4000 LF	22.092	3.100	2.647			27.839		
1FBY 3	DRILL HOLES FOR PILES	84761	100388	5933			191082	.624	1FBY 3
	31730 LF	2.671	3.164	.187			6.022		
1FBY 4	SPLICE,PLACE,TRIM PILE	135449	49921	2727526			2912896	9.518	1FBY 4
	668 EA	202.768	74.732	4083.123			4360.623		
1FBY 5	EXCAV. BETWEEN PILES	192097	245362	13447			450906	1.473	1FBY 5
	33333 CY	5.763	7.361	.403			13.527		

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 5-1JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1FBY 6	OPERATE SLURRY EQUIP.	157104	35482	97797			290383	.949	1FBY 6
	360 SH	436.400	98.561	271.658			806.619		
1FBY 7	PLACE TREMIE CONC.	150751	59822	874103			1084676	3.544	1FBY 7
	28889 CY	5.218	2.071	30.257			37.546		
1FBY 8	DEMOB. SLURRY EQUIP.	9927	2816	695			13438	.044	1FBY 8
	10 DA	992.700	281.600	69.500			1343.800		
1FBY 9	PLACE LAGGING 1ST.10FT	57770	5299	30444			93513	.306	1FBY 9
	40000 SF	1.444	.132	.761			2.338		
1FBY 10	CLEAN&PATCH SPTC WALL	86451	19395	6972			112818	.369	1FBY 10
	220 DA	392.959	88.159	31.691			512.809		
1FBY ITEM	GROUND SUPPORT WALL	979761	561375	3768699			5309835	17.350	1FBY ITEM
	31111 SY	31.492	18.044	121.137			170.674		
1GEQ 1	SET BRACING LEVEL NO 2	104772	30562	695834			831168	2.716	1GEQ 1
	1377 TON	76.087	22.195	505.326			603.608		
1GEQ 2	PRESTRESS LEVEL NO 2	24134	563	1689			26386	.086	1GEQ 2
	1377 TON	17.527	.409	1.227			19.162		
1GEQ 3	SET BRACING LEVEL NO 3	117661	34322	836736			988719	3.231	1GEQ 3
	1657 TON	71.008	20.713	504.970			596.692		
1GEQ 4	PRESTRESS LEVEL NO 3	27102	632	1897			29631	.097	1GEQ 4
	1657 TON	16.356	.381	1.145			17.882		

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 5-1JY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1GEQ 5	SET BRACING LEVEL NO 4	117236	34198	833707			985141	3.219	1GEQ 5
	1651 TON	71.009	20.714	504.971			596.694		
1GEQ 6	PRESTRESS LEVEL NO 4	27004	630	1890			29524	.096	1GEQ 6
	1651 TON	16.356	.382	1.145			17.882		
1GEQ 7	SET BRACING LEVEL NO 5	99681	29077	661978			790736	2.584	1GEQ 7
	1310 TON	76.092	22.196	505.327			603.615		
1GEQ 8	PRESTRESS LEVEL NO 5	24134	563	1689			26386	.086	1GEQ 8
	1377 TON	17.527	.409	1.227			19.162		
1GEQ 11	REMOVE BRACING LEVEL 5	38941	16356	2726			58023	.190	1GEQ 11
	1310 TON	29.726	12.485	2.081			44.292		
1GEQ 12	REMOVE BRACING LEVEL 4	49076	20611	3435			73122	.239	1GEQ 12
	1651 TON	29.725	12.484	2.081			44.290		
1GEQ 13	REMOVE BRACING LEVEL 3	49252	20685	3448			73385	.240	1GEQ 13
	1657 TON	29.724	12.483	2.081			44.288		
1GEQ 14	REMOVE BRACING LEVEL 2	47755	20057	3343			71155	.233	1GEQ 14
	1377 TON	34.680	14.566	2.428			51.674		
1GEQ ITEM	INTERNAL BRACING	726748	208256	3048372			3983376	13.016	1GEQ ITEM
	6013 TON	120.863	34.634	506.964			662.461		
1HEQ 1	BREAK PAVEMENT & HAUL	33808	14069	2367			50244	.164	1HEQ 1
	14400 SY	2.348	.977	.164			3.489		

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 5-1JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1HEQ 2	EXCAVATE FIRST 5 FT	130060	62830	45254			238144	.778	1HEQ 2
	24100 CY	5.397	2.607	1.878			9.881		
1HEQ 3	EXCAVATE 5 TO 22 FT	267546	189428	141578			598552	1.956	1HEQ 3
	81900 CY	3.267	2.313	1.729			7.308		
1HEQ 4	EXCAVATE 22 TO 30 FT	121167	118130	66232			305529	.998	1HEQ 4
	38500 CY	3.147	3.068	1.720			7.936		
1HEQ 5	EXCAVATE 30 TO 50 FT	275085	337244	163706			776035	2.536	1HEQ 5
	96300 CY	2.857	3.502	1.700			8.059		
1HEQ 6	EXCAVATE 50 TO 70 FT	296242	363182	165187			824611	2.694	1HEQ 6
	96300 CY	3.076	3.771	1.715			8.563		
1HEQ 7	FINE GRADE INVERT	77379	35489	24167			137035	.448	1HEQ 7
	14400 SY	5.374	2.465	1.678			9.516		
1HEQ ITEM	EXCAVATION	1201287	1120372	608491			2930150	9.574	1HEQ ITEM
	337100 CY	3.564	3.324	1.805			8.692		
1IBR 1	LEVELING SLAB FORMS	11966		3988			15954	.052	1IBR 1
	20 EA	598.300		199.400			797.700		
1IBR 2	POUR LEVELING SLAB	27040	2762	1893	45954		77649	.254	1IBR 2
	1580 CY	17.114	1.748	1.198	29.085		49.145		
1IBR 3	BASE SLAB REBAR,	415661	29730	29096	1112160		1586647	5.184	1IBR 3
	2648 TON	156.972	11.227	10.988	420.000		599.187		

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 5-1JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1IBR 4	BASE SLAB BLKHDS&WK.FM	111766		12599			124365	.406	1IBR 4
	18680 SF	5.983		.674			6.658		
1IBR 5	BASE SLAB-POUR,CLEANUP	135204	13808	9464	1086005		1244481	4.066	1IBR 5
	35300 CY	3.830	.391	.268	30.765		35.254		
1IBR 9	ASSEM.STL.WL&RF&PL FRM	21406	1947	164618			187971	.614	1IBR 9
	20 DA	1070.300	97.350	8230.900			9398.550		
1IBR 11	WALL REBAR	86571	5364	6060	175140		273135	.892	1IBR 11
	417 TON	207.604	12.863	14.532	420.000		655.000		
1IBR 12	MOVE & SET STEEL FORMS	423539		42198			465737	1.522	1IBR 12
	2000 LF	211.770		21.099			232.869		
1IBR 13	ROOF SLAB REBAR	343033	21255	24012	606480		994780	3.250	1IBR 13
	1444 TON	237.557	14.720	16.629	420.000		688.906		
1IBR 14	POUR WALLS & ROOF SLAB	135204	13808	9464	763587		922063	3.013	1IBR 14
	24820 CY	5.447	.556	.381	30.765		37.150		
1IBR 15	PLACE ROOF WATERPROOF					147600	147600	.482	1IBR 15
	14400 SY					10.250	10.250		
1IBR 16	MORTAR PROT.FOR W.P.	50902	7308	5243	61070		124523	.407	1IBR 16
	1584 CY	32.135	4.614	3.310	38.554		78.613		
1IBR 17	FORM PLENUM DECK	81576		8380			89956	.294	1IBR 17
	2000 LF	40.788		4.190			44.978		
1IBR 18	PLEN.DECK REBAR	60160	2650	4211	76800		143821	.470	1IBR 18
	240 TON	250.667	11.042	17.546	320.000		599.254		

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 5-1JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1IBR 19	POUR PLENUM DECK	55226	9466	3866	99674		168232	.550	1IBR 19
	3000 CY	18.409	3.155	1.289	33.225		56.077		
1IBR 20	CONST.PLENUM DIV. WALL	20218	1261	2105	12250		35834	.117	1IBR 20
	200 CY	101.090	6.305	10.525	61.250		179.170		
1IBR 21	ELECTRICAL EMBEDDED					230000	230000	.752	1IBR 21
1IBR 22	MECHANICAL EMBEDDED					105000	105000	.343	1IBR 22
1IBR 23	PATCH&POINT CONC.WORK	84847		5939	4900		95686	.313	1IBR 23
	416000 SF	.204		.014	.012		.230		
1IBR 24	CLEAN UP STRUCTURE	11829	662	828			13319	.044	1IBR 24
	20 DA	591.450	33.100	41.400			665.950		
1IBR ITEM	CONSTRUCT PERM.STRUCT.	2076148	110021	333964	4044020	482600	7046753	23.026	1IBR ITEM
	64900 CY	31.990	1.695	5.146	62.312	7.436	108.579		
1JEQ 1	BACKFILL & TAMP 2 FT	56256	2500	3938	38400		101094	.330	1JEQ 1
	9600 CY	5.860	.260	.410	4.000		10.531		
1JEQ 2	BACKFILL & TAMP 2-22FT	217278	26990	15209	385200		644677	2.107	1JEQ 2
	96300 CY	2.256	.280	.158	4.000		6.694		
1JEQ 3	BACKFILL & TMP 22-41FT	102493	12731	7175	212000		334399	1.093	1JEQ 3
	53000 CY	1.934	.240	.135	4.000		6.309		
1JEQ 4	BACKFILL & TMP.TOP 5FT	163128	20264	11419	96400		291211	.952	1JEQ 4
	24100 CY	6.769	.841	.474	4.000		12.083		
1JEQ ITEM	BACKFILL	539155	62485	37741	732000		1371381	4.481	1JEQ ITEM
	183000 CY	2.946	.341	.206	4.000		7.494		

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 5-1JY

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1K00	1	PLACE 6IN SUBGRADE	13803	3800	966	16700		35269	.115	1K00 1
		13350 SY	1.034	.285	.072	1.251		2.642		
1K00	2	PLACE 4IN BASE COURSE	13803	3800	966	10680		29249	.096	1K00 2
		13350 SY	1.034	.285	.072	.800		2.191		
1K00	3	STREET PAVING					42343	42343	.138	1K00 3
		13350 SY					3.172	3.172		
1K00	5	BREAKOUT REM. SIDEWALK	13783	5736	965			20484	.067	1K00 5
		5870 SY	2.348	.977	.164			3.490		
1K00	6	BF&TMP.SIDEWALK VAULTS	66686	8283	4668	40000		119637	.391	1K00 6
		9852 CY	6.769	.841	.474	4.060		12.143		
1K00	7	PLACE 4IN SIDEWK.SUBGR	13416	3693	939	5200		23248	.076	1K00 7
		7785 SY	1.723	.474	.121	.668		2.986		
1K00	8	PLACE 4IN CONC.SIDEWLK	45719		4340	27307		77366	.253	1K00 8
		7785 SY	5.873		.557	3.508		9.938		
1K00	9	ACCESS WALKWAY	18663	1325	5554			25542	.083	1K00 9
		40 DA	466.575	33.125	138.850			638.550		
1K00	ITEM	STREET RESTORATION	185873	26637	18398	99887	42343	373138	1.219	1K00 ITEM
		13350 SY	13.923	1.995	1.378	7.482	3.172	27.950		
1N00	1	FIXED EXPENSE	67200	30000	237704			334904	1.094	1N00 1
1N00	ITEM	OVERHEAD-FIXED COSTS	67200	30000	237704			334904	1.094	1N00 ITEM

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 5-1JY

			TOTAL COST ANALYSIS			PROJECT SUMMARY				
			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1OJQ	1	OVERHEAD LABOR	1239200		86744			1325944	4.333	1OJQ 1
		39 MO	31774.359		2224.205			33998.564		
1OJQ	2	OVERHEAD EXPENSES			412950			412950	1.349	1OJQ 2
		39 MO			10588.462			10588.462		
1OJQ	3	GENERAL SERVICE CREW	1057000	89838	73990			1220828	3.989	1OJQ 3
		700 DA	1510.000	128.340	105.700			1744.040		
1OJQ	4	VEHICLE OPERATION		39000				39000	.127	1OJQ 4
		39 MO		1000.000				1000.000		
1OJQ	ITEM	OVERHEAD-TIME RELATED	2296200	128838	573684			2998722	9.798	1OJQ ITEM
		39 MO	58876.923	3303.538	14709.846			76890.308		
1P00	1	FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	.674	1P00 1
1P00	ITEM	PLANT-FIXED COSTS	82760	25000	79793		18800	206353	.674	1P00 ITEM
1QJQ	1	TIME RELATED COSTS			201600			201600	.659	1QJQ 1
		39 MO			5169.231			5169.231		
1QJQ	ITEM	PLANT-TIME RELATED			201600			201600	.659	1QJQ ITEM
		39 MO			5169.231			5169.231		

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 5-1JY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	9684999	2636244	11112385	4906886	2263455	30603969	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 1-1LY

FOUR LANE HIGHWAY TUNNEL
SITE 1 - 70' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

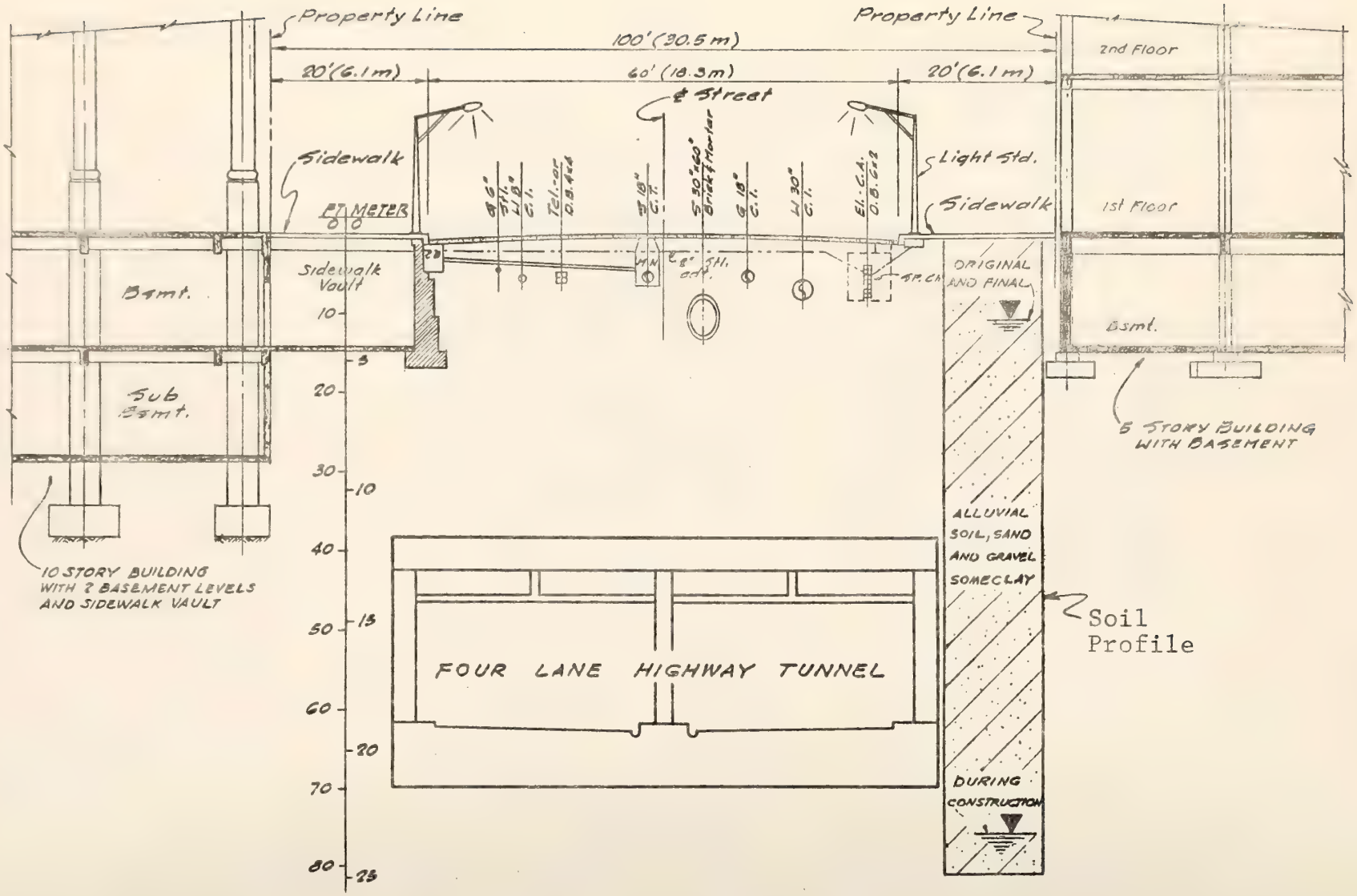


Figure 3. PROJECT 1-1LY - HIGHWAY TUNNEL
SITE 1 - 70' DEPTH
PRECAST CONCRETE PANELS - INTERNAL BRACING

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	9174157	2404064	6257638	6828638	3788326	28452823	100.000
PROJECT						28452823	100.000

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

			TOTAL COST ANALYSIS			PROJECT SUMMARY				
			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1A00	1	CONST.BARRICADES ETC.	42253	1166	37713			81132	.285	1A00 1
		45 DA	938.956	25.911	838.067			1802.933		
1A00	2	SET&MOVE BARRICADES ET	28807	2718	5271			36796	.129	1A00 2
		45 DA	640.156	60.400	117.133			817.689		
1A00	3	FLAGMEN-DIRECT TRAFFIC	46416		3249			49665	.175	1A00 3
		300 DA	154.720		10.830			165.550		
1A00	ITEM	CONTROL TRAFFIC	117476	3884	46233			167593	.589	1A00 ITEM
1BD1	1	ALL OPERATIONS	198151	18680	199450	8000	1719712	2143993	7.535	1BD1 1
1BD1	ITEM	UTILITY WORK-ALTERNATE	198151	18680	199450	8000	1719712	2143993	7.535	1BD1 ITEM
1CD0	1	GENL EXTERIOR PROTECT	21501	6955	7550			36006	.127	1CD0 1
		40 DA	537.525	173.875	188.750			900.150		
1CD0	2	SIDEWALK VAULTS &WALLS	94179	18024	21703	22979		156885	.551	1CD0 2
		1000 LF	94.179	18.024	21.703	22.979		156.885		
1CD0	ITEM	PROTECT ADJ STRUCTURES	115680	24979	29253	22979		192891	.678	1CD0 ITEM
1DD7	1	ALL OPERATIONS					1037051	1037051	3.645	1DD7 1
1DD7	ITEM	CONTROL GRNDWTR-ALT					1037051	1037051	3.645	1DD7 ITEM

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1E00 1	CENTER PILE EXPL HOLE	14847	2083	4339			21269	.075	1E00 1
	168 EA	88.375	12.399	25.827			126.601		
1E00 2	DRILL HOLES-CENTR PILE	56098	66441	3927			126466	.444	1E00 2
	168 EA	333.917	395.482	23.375			752.774		
1E00 3	OPERATE SLURRY EQUIP	36657	8279	5629			50565	.178	1E00 3
	84 SH	436.393	98.560	67.012			601.964		
1E00 4	SPLICE,PLACE,TRIM,PILE	34065	12555	135925			182545	.642	1E00 4
	168 EA	202.768	74.732	809.077			1086.577		
1E00 5	BACKFILL PILE HOLES	14776	3706	16453			34935	.123	1E00 5
	168 EA	87.952	22.060	97.935			207.946		
1E00 6	PILE CAPS,WALES,DECKBM	237130	51949	969599			1258678	4.424	1E00 6
	1906 TON	124.412	27.256	508.709			660.377		
1E00 7	LATERAL & SWAY BRACING	77158	13850	110401			201409	.708	1E00 7
	150 TON	514.387	92.333	736.007			1342.727		
1E00 8	DECK MATS & TIMBERS	74487	5501	557444			637432	2.240	1E00 8
	15778 SY	4.721	.349	35.330			40.400		
1E00 9	REPOST DECK SUPPORT	81144	25140	18280			124564	.438	1E00 9
	168 EA	483.000	149.643	108.810			741.452		
1E00 11	REMOVE TIMBER DECKING	35237	5443	2467			43147	.152	1E00 11
	15778 SY	2.233	.345	.156			2.735		
1E00 12	RMV.DECK BMS.&INT.PILE	82189	35123	5753			123065	.433	1E00 12
	1859 TON	44.211	18.893	3.095			66.200		

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1E00 13	REMOVE WALES & CAPS	31832	13603	2228			47663	.168	1E00 13
	450 TON	70.738	30.229	4.951			105.918		
1E00 14	REM.LAG.&PILES TO -6	31831	8611	2228			42670	.150	1E00 14
	4000 LF	7.958	2.153	.557			10.668		
1E00 ITEM	STREET DECKING	807451	252284	1834673			2894408	10.173	1E00 ITEM
	15778 SY	51.176	15.990	116.280			183.446		
1FCY 1	MOB.SLURRY PLT,EQUIP.	17083	30490	1196			48769	.171	1FCY 1
	30 DA	569.433	1016.333	39.867			1625.633		
1FCY 2	PRECAST YARD	281750	131797	19723	2137972	491920	3063162	10.766	1FCY 2
	170 DA	1657.353	775.276	116.018	12576.306	2893.647	18018.600		
1FCY 3	TRENCH @ WALL LOCATION	88368	12400	77997			178765	.628	1FCY 3
	4000 LF	22.092	3.100	19.499			44.691		
1FCY 4	EXCV SLOT FOR PANELS	212686	271662	14888			499236	1.755	1FCY 4
	36444 CY	5.836	7.454	.409			13.699		
1FCY 5	SET PRE-CAST PANELS	216890	110194	32507			359591	1.264	1FCY 5
	668 EA	324.686	164.961	48.663			538.310		
1FCY 6	OPERATE SLURRY EQUIP.	314208	70963	408210			793381	2.788	1FCY 6
	240 DA	1309.200	295.679	1700.875			3305.754		
1FCY 7	DEMOBE.SLURRY EQUIP.	9927	2816	695			13438	.047	1FCY 7
	10 DA	992.700	281.600	69.500			1343.800		

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1FCY 8	PLACE LAGGING 1ST.10FT	57770	5299	30444			93513	.329	1FCY 8
	40000 SF	1.444	.132	.761			2.338		
1FCY 9	CLN.PNL.& PATCH JT.	94311	21159	15548			131018	.460	1FCY 9
	240 DA	392.963	88.163	64.783			545.908		
1FCY ITEM	GROUND SUPPORT WALL	1292993	656780	601208	2137972	491920	5180873	18.209	1FCY ITEM
	31111 SY	41.561	21.111	19.325	68.721	15.812	166.529		
1GEQ 1	SET BRACING LEVEL NO 2	98169	28636	571372			698177	2.454	1GEQ 1
	1129 TON	86.952	25.364	506.087			618.403		
1GEQ 2	PRESTRESS LEVEL NO 2	22612	527	1583			24722	.087	1GEQ 2
	1129 TON	20.028	.467	1.402			21.897		
1GEQ 3	SET BRACING LEVEL NO 3	108437	31631	631091			771159	2.710	1GEQ 3
	1247 TON	86.958	25.366	506.087			618.411		
1GEQ 4	PRESTRESS LEVEL NO 3	24978	582	1748			27308	.096	1GEQ 4
	1247 TON	20.030	.467	1.402			21.899		
1GEQ 5	SET BRACING LEVEL NO 4	106775	31146	433474			571395	2.008	1GEQ 5
	852 TON	125.323	36.556	508.772			670.651		
1GEQ 6	PRESTRESS LEVEL NO 4	24595	573	1722			26890	.095	1GEQ 6
	852 TON	28.867	.673	2.021			31.561		
1GEQ 7	SET BRACING LEVEL NO 5	106775	31146	433474			571395	2.008	1GEQ 7
	852 TON	125.323	36.556	508.772			670.651		

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1GEQ 8	PRESTRESS LEVEL NO 5	24595	573	1722			26890	.095	1GEQ 8
	852 TON	28.867	.673	2.021			31.561		
1GEQ 11	REMOVE BRACING LEVEL 5	41231	17317	2886			61434	.216	1GEQ 11
	852 TON	48.393	20.325	3.387			72.106		
1GEQ 12	REMOVE BRACING LEVEL 4	41231	17317	2886			61434	.216	1GEQ 12
	852 TON	48.393	20.325	3.387			72.106		
1GEQ 13	REMOVE BRACING LEVEL 3	43249	18165	3027			64441	.226	1GEQ 13
	1247 TON	34.682	14.567	2.427			51.677		
1GEQ 14	REMOVE BRACING LEVEL 2	39150	16442	2741			58333	.205	1GEQ 14
	1129 TON	34.677	14.563	2.428			51.668		
1GEQ ITEM	INTERNAL BRACING	681797	194055	2087726			2963578	10.416	1GEQ ITEM
	4080 TON	167.107	47.563	511.698			726.367		
1HEQ 1	BREAK PAVEMENT & HAUL	32871	13680	2301			48852	.172	1HEQ 1
	14000 SY	2.348	.977	.164			3.489		
1HEQ 2	EXCAVATE FIRST 5 FT	125744	60745	8802			195291	.686	1HEQ 2
	23300 CY	5.397	2.607	.378			8.382		
1HEQ 3	EXCAVATE 5 TO 22 FT	201739	151609	14122			367470	1.292	1HEQ 3
	79300 CY	2.544	1.912	.178			4.634		
1HEQ 4	EXCAVATE 22 TO 30 FT	91770	98949	6424			197143	.693	1HEQ 4
	37300 CY	2.460	2.653	.172			5.285		

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1HEQ 5	EXCAVATE 30 TO 50 FT	198565	252277	13900			464742	1.633	1HEQ 5
	93300 CY	2.128	2.704	.149			4.981		
1HEQ 6	EXCAVATE 50 TO 70 FT	220637	280316	15445			516398	1.815	1HEQ 6
	93300 CY	2.365	3.004	.166			5.535		
1HEQ 7	FINE GRADE INVERT	60183	27603	4213			91999	.323	1HEQ 7
	14000 SY	4.299	1.972	.301			6.571		
1HEQ ITEM	EXCAVATION	931509	885179	65207			1881895	6.614	1HEQ ITEM
	326500 CY	2.853	2.711	.200			5.764		
1ICR 1	LEVELING SLAB FORMS	11966		3988			15954	.056	1ICR 1
	20 EA	598.300		199.400			797.700		
1ICR 2	POUR LEVELING SLAB	27040	2762	1893	45982		77677	.273	1ICR 2
	1540 CY	17.558	1.794	1.229	29.858		50.440		
1ICR 3	BASE SLAB REBAR,	415661	29730	29096	1112160		1586647	5.576	1ICR 3
	2648 TON	156.972	11.227	10.988	420.000		599.187		
1ICR 4	BASE SLAB BLKHDS&WK.FM	111766		12599			124365	.437	1ICR 4
	18680 SF	5.983		.674			6.658		
1ICR 5	BASE SLAB-POUR,CLEANUP	135204	13808	9464	1086005		1244481	4.374	1ICR 5
	35300 CY	3.830	.391	.268	30.765		35.254		
1ICR 9	ASSEM.STL.WL&RF&PL FRM	16055	1460	137124			154639	.543	1ICR 9
	15 DA	1070.333	97.333	9141.600			10309.267		

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1ICR 11	WALL REBAR	62004	3842	4340	85260		155446	.546	1ICR 11
	203 TON	305.438	18.926	21.379	420.000		765.744		
1ICR 12	MOVE & SET STEEL FORMS	423539		42198			465737	1.637	1ICR 12
	2000 LF	211.770		21.099			232.869		
1ICR 13	ROOF SLAB REBAR	343033	21255	24012	606480		994780	3.496	1ICR 13
	1444 TON	237.557	14.720	16.629	420.000		688.906		
1ICR 14	POUR WALLS & ROOF SLAB	135204	13808	9464	662737		821213	2.886	1ICR 14
	21960 CY	6.157	.629	.431	30.179		37.396		
1ICR 15	PLACE ROOF WATERPROOF					143500	143500	.504	1ICR 15
	14000 SY					10.250	10.250		
1ICR 16	MORTAR PROT.FOR W.P.	25707	3691	3479	59667		92544	.325	1ICR 16
	1540 CY	16.693	2.397	2.259	38.745		60.094		
1ICR 17	FORM PLENUM DECK	81576		8380			89956	.316	1ICR 17
	2000 LF	40.788		4.190			44.978		
1ICR 18	PLEN.DECK REBAR	60160	2650	4211	76800		143821	.505	1ICR 18
	240 TON	250.667	11.042	17.546	320.000		599.254		
1ICR 19	POUR PLENUM DECK	55226	9466	3866	99674		168232	.591	1ICR 19
	3000 CY	18.409	3.155	1.289	33.225		56.077		
1ICR 20	CONST.PLENUM DIV. WALL	20218	1261	2105	12250		35834	.126	1ICR 20
	200 CY	101.090	6.305	10.525	61.250		179.170		
1ICR 21	ELECTRICAL EMBEDDED					230000	230000	.808	1ICR 21

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1ICR 22	MECHANICAL EMBEDDED					105000	105000	.369	1ICR 22
1ICR 23	PATCH&POINT CONC.WORK	69143		4840	3985		77968	.274	1ICR 23
	339000 SF	.204		.014	.012		.230		
1ICR 24	CLEAN UP STRUCTURE	11829	662	828			13319	.047	1ICR 24
	20 DA	591.450	33.100	41.400			665.950		
1ICR ITEM	CONSTRUCT PERM.STRUCT.	2005331	104395	301887	3851000	478500	6741113	23.692	1ICR ITEM
	62000 CY	32.344	1.684	4.869	62.113	7.718	108.728		
1JEQ 1	BACKFILL & TAMP 2 FT	54498	2422	3815	37200		97935	.344	1JEQ 1
	9300 CY	5.860	.260	.410	4.000		10.531		
1JEQ 2	BACKFILL & TAMP 2-22FT	210510	26150	14736	373200		624596	2.195	1JEQ 2
	93300 CY	2.256	.280	.158	4.000		6.694		
1JEQ 3	BACKFILL & TMP 22-41FT	99217	12324	6945	205200		323686	1.138	1JEQ 3
	51300 CY	1.934	.240	.135	4.000		6.310		
1JEQ 4	BACKFILL & TMP.TOP 5FT	157713	19591	11040	93200		281544	.990	1JEQ 4
	23300 CY	6.769	.841	.474	4.000		12.083		
1JEQ ITEM	BACKFILL	521938	60487	36536	708800		1327761	4.667	1JEQ ITEM
	177200 CY	2.945	.341	.206	4.000		7.493		
1K00 1	PLACE 6IN SUBGRADE	13803	3800	966	16700		35269	.124	1K00 1
	13350 SY	1.034	.285	.072	1.251		2.642		

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1K00	2	PLACE 4IN BASE COURSE	13803	3800	966	10680		29249	.103	1K00 2
		13350 SY	1.034	.285	.072	.800		2.191		
1K00	3	STREET PAVING					42343	42343	.149	1K00 3
		13350 SY					3.172	3.172		
1K00	5	BREAKOUT REM. SIDEWALK	13783	5736	965			20484	.072	1K00 5
		5870 SY	2.348	.977	.164			3.490		
1K00	6	BF&TMP.SIDEWALK VAULTS	66686	8283	4668	40000		119637	.420	1K00 6
		9852 CY	6.769	.841	.474	4.060		12.143		
1K00	7	PLACE 4IN SIDEWK.SUBGR	13416	3693	939	5200		23248	.082	1K00 7
		7785 SY	1.723	.474	.121	.668		2.986		
1K00	8	PLACE 4IN CONC.SIDEWLK	45719		4340	27307		77366	.272	1K00 8
		7785 SY	5.873		.557	3.508		9.938		
1K00	9	ACCESS WALKWAY	18663	1325	5554			25542	.090	1K00 9
		40 DA	466.575	33.125	138.850			638.550		
1K00	ITEM	STREET RESTORATION	185873	26637	18398	99887	42343	373138	1.311	1K00 ITEM
		13350 SY	13.923	1.995	1.378	7.482	3.172	27.950		
1N00	1	FIXED EXPENSE	67200	30000	226204			323404	1.137	1N00 1
1N00	ITEM	OVERHEAD-FIXED COSTS	67200	30000	226204			323404	1.137	1N00 ITEM
1OLQ	1	OVERHEAD LABOR	1169400		81858			1251258	4.398	1OLQ 1
		37 MO	31605.405		2212.378			33817.784		

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1OLQ 2	OVERHEAD EXPENSES			388850			388850	1.367	1OLQ 2
	37 MO			10509.459			10509.459		
1OLQ 3	GENERAL SERVICE CREW	996598	84704	69762			1151064	4.046	1OLQ 3
	660 DA	1509.997	128.339	105.700			1744.036		
1OLQ 4	VEHICLE OPERATION		37000				37000	.130	1OLQ 4
	37 MO		1000.000				1000.000		
1OLQ ITEM	OVERHEAD-TIME RELATED	2165998	121704	540470			2828172	9.940	1OLQ ITEM
	37 MO	58540.486	3289.297	14607.297			76437.081		
1P00 1	FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	.725	1P00 1
1P00 ITEM	PLANT-FIXED COSTS	82760	25000	79793		18800	206353	.725	1P00 ITEM
1QLQ 1	TIME RELATED COSTS			190600			190600	.670	1QLQ 1
	37 MO			5151.351			5151.351		
1QLQ ITEM	PLANT-TIME RELATED			190600			190600	.670	1QLQ ITEM
	37 MO			5151.351			5151.351		

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	9174157	2404064	6257638	6828638	3788326	28452823	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 3-1KY

FOUR LANE HIGHWAY TUNNEL
SITE 3 - 70' DEPTH
CAST-IN-SLURRY CONCRETE (SPTC) GROUND SUPPORT
TIEBACK BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

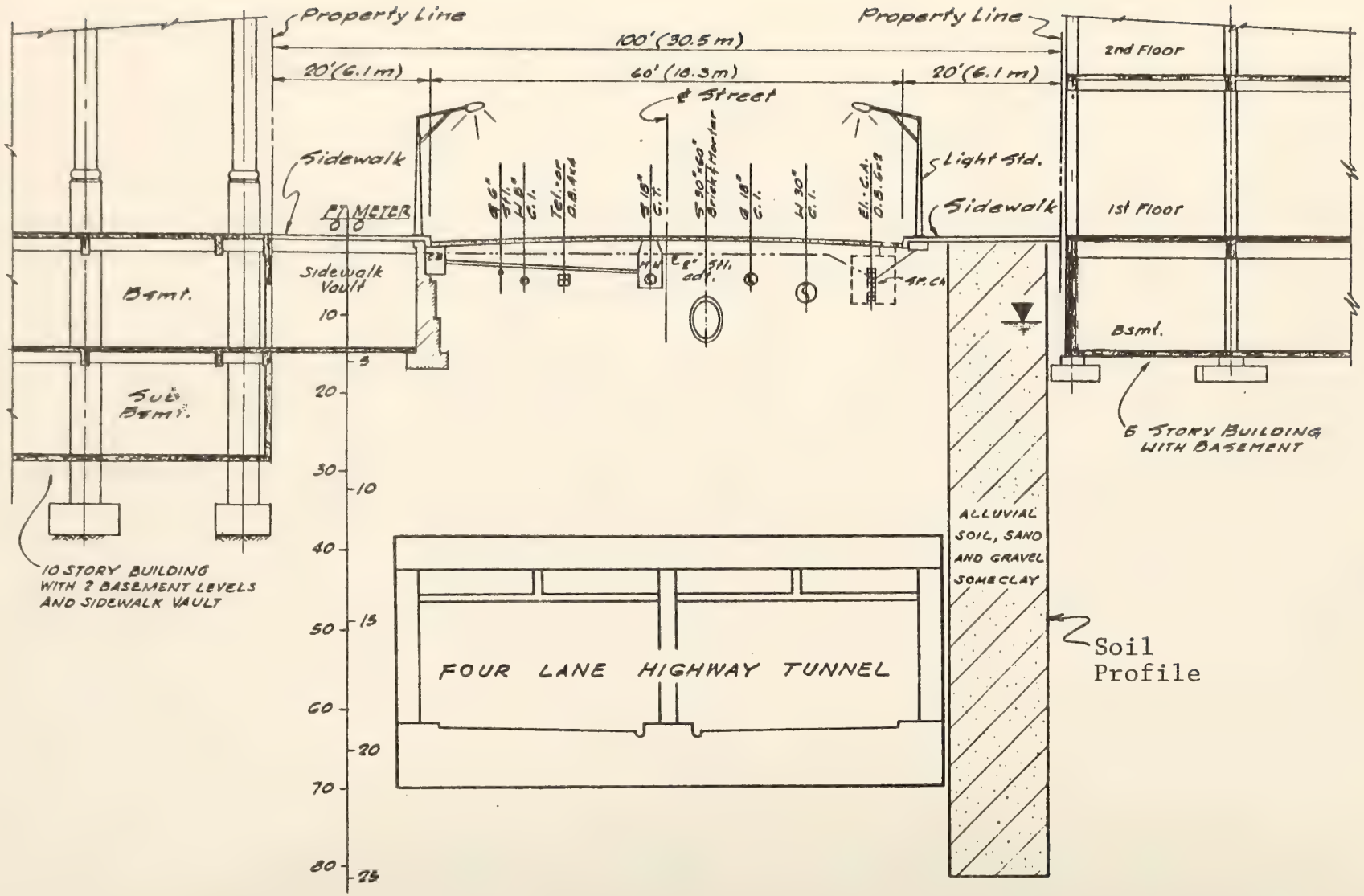


Figure 4. PROJECT 3-1KY - HIGHWAY TUNNEL
SITE 3 - 70' DEPTH
CAST-IN-SLURRY (SPTC) - TIEBACK BRACING

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	10025265	2969113	8186201	4926086	3354063	29460728	100.000
PROJECT						29460728	100.000

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1A00 1	CONST.BARRICADES ETC.	42253	1166	37713			81132	.275	1A00 1
	45 DA	938.956	25.911	838.067			1802.933		
1A00 2	SET&MOVE BARRICADES ET	28807	2718	5271			36796	.125	1A00 2
	45 DA	640.156	60.400	117.133			817.689		
1A00 3	FLAGMEN-DIRECT TRAFFIC	46416		3249			49665	.169	1A00 3
	300 DA	154.720		10.830			165.550		
1A00 ITEM	CONTROL TRAFFIC	117476	3884	46233			167593	.569	1A00 ITEM
1BD0 21	UTILITY SUPPORT LONG.	89387	11040	88139			188566	.640	1BD0 21
	2000 LF	44.694	5.520	44.070			94.283		
1BD0 22	UTILITY SUPPORT INTER.	41209	2120	32429			75758	.257	1BD0 22
	4 EA	10302.250	530.000	8107.250			18939.500		
1BD0 23	STORM DR&SEW.TEMP.LONG	44693	5520	39129			89342	.303	1BD0 23
	4000 LF	11.173	1.380	9.782			22.336		
1BD0 24	STORM DR&SEW.PERM.LONG					180000	180000	.611	1BD0 24
	4000 LF					45.000	45.000		
1BD0 26	SEWER PERM. LONGIT.					49200	49200	.167	1BD0 26
	4000 LF					12.300	12.300		
1BD0 28	SEW. 18IN PERM. INTER.					7380	7380	.025	1BD0 28
	4 EA					1845.000	1845.000		
1BD0 30	STM.DR.LATER.PERM.LONG					2400	2400	.008	1BD0 30
	8 EA					300.000	300.000		

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1BD0 32	STM.DR.LATER.PERM.INT.					2400	2400	.008	1BD0 32
	8 EA					300.000	300.000		
1BD0 33	BLDG.SEW.LATERALS PERM					3667	3667	.012	1BD0 33
	55 EA					66.673	66.673		
1BD0 35	MANHOLES SEW.PERM.LONG					9200	9200	.031	1BD0 35
	8 EA					1150.000	1150.000		
1BD0 37	MANHOLES SEW.PERM.INT.					4600	4600	.016	1BD0 37
	4 EA					1150.000	1150.000		
1BD0 38	CATCH BASINS LONGIT.					7600	7600	.026	1BD0 38
	8 EA					950.000	950.000		
1BD0 39	CATCH BASINS INTER.					7600	7600	.026	1BD0 39
	8 EA					950.000	950.000		
1BD0 40	DIVERT 18IN SEWER INT.					55904	55904	.190	1BD0 40
	4 EA					13976.000	13976.000		
1BD0 41	WAT.MAIN 30IN CI LONG.					200000	200000	.679	1BD0 41
	2000 LF					100.000	100.000		
1BD0 42	WATER 8IN LONGITUDINAL					70300	70300	.239	1BD0 42
	2000 LF					35.150	35.150		
1BD0 43	WATER 8IN INTERSECTION					23817	23817	.081	1BD0 43
	4 EA					5954.250	5954.250		
1BD0 44	RELOCATE FIRE HYD.LONG					10000	10000	.034	1BD0 44
	4 EA					2500.000	2500.000		

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1BD0 45	RELOCATE FIRE HYD.INT.					20000	20000	.068	1BD0 45
	8 EA					2500.000	2500.000		
1BD0 46	DIVERT 8IN WATER INTER					6212	6212	.021	1BD0 46
	4 EA					1553.000	1553.000		
1BD0 51	GAS MAIN TEMP.LONG.					150000	150000	.509	1BD0 51
	2000 LF					75.000	75.000		
1BD0 52	GAS MAIN.PERM.LONG.					90000	90000	.305	1BD0 52
	2000 LF					45.000	45.000		
1BD0 53	GAS LINE 6IN.INTERSECT					8145	8145	.028	1BD0 53
	4 EA					2036.250	2036.250		
1BD0 54	GAS LINE 6IN TEMP.LONG					114300	114300	.388	1BD0 54
	2000 LF					57.150	57.150		
1BD0 55	GAS LINE 6IN LONGITUD.					54300	54300	.184	1BD0 55
	2000 LF					27.150	27.150		
1BD0 56	DIVERT 6IN GAS INTER.					26840	26840	.091	1BD0 56
	4 EA					6710.000	6710.000		
1BD0 61	TELEPH.4X4 DUCT LONGIT					58500	58500	.199	1BD0 61
	2000 LF					29.250	29.250		
1BD0 62	TELEPH.4X4 DUCT INTER.					8775	8775	.030	1BD0 62
	4 EA					2193.750	2193.750		
1BD0 63	TELEPHONE MANHOLE LONG					39960	39960	.136	1BD0 63
	4 EA					9990.000	9990.000		

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1BD0 64	TELEPHONE MANHOLE INT.					39960	39960	.136	1BD0 64
	4 EA					9990.000	9990.000		
1BD0 65	DIVERT TEL.DUCT INTER.					171212	171212	.581	1BD0 65
	4 EA					42803.000	42803.000		
1BD0 71	ELECT DUCT BK.2X6 LONG			33175			33175	.113	1BD0 71
	2000 LF			16.588			16.588		
1BD0 72	ELECT.DUCT 2X6 INTER.			4977			4977	.017	1BD0 72
	4 EA			1244.250			1244.250		
1BD0 73	ST.LT&TR.SIG.COND.INT.					19000	19000	.064	1BD0 73
	4 EA					4750.000	4750.000		
1BD0 74	STREET LIGHT TEMP.LONG	1596		112			1708	.006	1BD0 74
	24 EA	66.500		4.667			71.167		
1BD0 75	STREET LIGHT PERM.LONG	1596		112		5040	6748	.023	1BD0 75
	24 EA	66.500		4.667		210.000	281.167		
1BD0 76	TR.SIG.CONTRL.TEMP INT				8000		8000	.027	1BD0 76
	4 EA				2000.000		2000.000		
1BD0 77	TR.SIG.CONTRL.PERM INT					600	600	.002	1BD0 77
	4 EA					150.000	150.000		
1BD0 78	PED.&TRAFFIC SIG.PERM.					4800	4800	.016	1BD0 78
	4 EA					1200.000	1200.000		
1BD0 79	DIVERT ELECT DUCT INT.					103000	103000	.350	1BD0 79
	4 EA					25750.000	25750.000		

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1BD0 80	DIVERT BLDG.LATER LONG					165000	165000	.560	1BD0 80
	55 EA					3000.000	3000.000		
1BD0 81	REMOVE UTILITIES SUPP.	19670		1377			21047	.071	1BD0 81
	2000 LF	9.835		.689			10.524		
1BD0 ITEM	UTILITY WORK	198151	18680	199450	8000	1719712	2143993	7.277	1BD0 ITEM
1CD0 1	GENL EXTERIOR PROTECT	21501	6955	7550			36006	.122	1CD0 1
	40 DA	537.525	173.875	188.750			900.150		
1CD0 2	SIDEWALK VAULTS&WALLS	94179	18024	21703	22979		156885	.533	1CD0 2
	1000 LF	94.179	18.024	21.703	22.979		156.885		
1CD0 ITEM	PROTECT ADJ STRUCTURES	115680	24979	29253	22979		192891	.655	1CD0 ITEM
1DDY 1	F.I.&R. PUMP SYSTEM					297829	297829	1.011	1DDY 1
1DDY 2	F.I.&R. RECHARGE SYST					294270	294270	.999	1DDY 2
1DDY 3	MAINT SYST-FIRST 6 MOS					183219	183219	.622	1DDY 3
	6 MO					30536.500	30536.500		
1DDY 4	MAINT SYST-AFTER 6 MOS					315290	315290	1.070	1DDY 4
	10 MO					31529.000	31529.000		
1DDY ITEM	CONTROL GROUNDWATER					1090608	1090608	3.702	1DDY ITEM

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1E00 1	CENTER PILE EXPL HOLE	14847	2083	4339			21269	.072	1E00 1
	168 EA	88.375	12.399	25.827			126.601		
1E00 2	DRILL HOLES-CENTR PILE	56098	66441	3927			126466	.429	1E00 2
	168 EA	333.917	395.482	23.375			752.774		
1E00 3	OPERATE SLURRY EQUIP	36657	8279	5629			50565	.172	1E00 3
	84 SH	436.393	98.560	67.012			601.964		
1E00 4	SPLICE,PLACE,TRIM,PILE	34065	12555	135925			182545	.620	1E00 4
	168 EA	202.768	74.732	809.077			1086.577		
1E00 5	BACKFILL PILE HOLES	14776	3706	16453			34935	.119	1E00 5
	168 EA	87.952	22.060	97.935			207.946		
1E00 6	PILE CAPS,WALES,DECKBM	230123	50414	989609			1270146	4.311	1E00 6
	1947 TON	118.194	25.893	508.274			652.361		
1E00 7	LATERAL & SWAY BRACING	77158	13850	110401			201409	.684	1E00 7
	150 TON	514.387	92.333	736.007			1342.727		
1E00 8	DECK MATS & TIMBERS	64961	4797	572317			642075	2.179	1E00 8
	16222 SY	4.005	.296	35.280			39.581		
1E00 9	REPOST DECK SUPPORT	81144	25140	18280			124564	.423	1E00 9
	168 EA	483.000	149.643	108.810			741.452		
1E00 11	REMOVE TIMBER DECKING	36228	5596	2536			44360	.151	1E00 11
	16222 SY	2.233	.345	.156			2.735		
1E00 12	RMV.DECK BMS.&INT.PILE	84002	35899	5880			125781	.427	1E00 12
	1900 TON	44.212	18.894	3.095			66.201		

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1E00 13	REMOVE WALES & CAPS	31832	13603	2228			47663	.162	1E00 13
	450 TON	70.738	30.229	4.951			105.918		
1E00 14	REM.LAG.&PILES TO -6	31831	8611	2228			42670	.145	1E00 14
	4000 LF	7.958	2.153	.557			10.668		
1E00 ITEM	STREET DECKING	793722	250974	1869752			2914448	9.893	1E00 ITEM
	16222 SY	48.929	15.471	115.260			179.660		
1FBY 1	MOB.SLURRY PLT.&EQUIP.	17083	30490	1196			48769	.166	1FBY 1
	30 DA	569.433	1016.333	39.867			1625.633		
1FBY 2	TRENCH @ WALL LOCATION	88368	12400	10586			111354	.378	1FBY 2
	4000 LF	22.092	3.100	2.647			27.839		
1FBY 3	DRILL HOLES FOR PILES	92864	109983	6500			209347	.711	1FBY 3
	34068 LF	2.726	3.228	.191			6.145		
1FBY 4	SPLICE,PLACE,TRIM PILE	135449	49921	1232241			1417611	4.812	1FBY 4
	668 EA	202.768	74.732	1844.672			2122.172		
1FBY 5	EXCAV. BETWEEN PILES	258984	330797	18129			607910	2.063	1FBY 5
	45333 CY	5.713	7.297	.400			13.410		
1FBY 6	OPERATE SLURRY EQUIP.	209472	47309	130513			387294	1.315	1FBY 6
	480 SH	436.400	98.560	271.902			806.863		
1FBY 7	PLACE TREMIE CONC.	191350	75932	1236045			1503327	5.103	1FBY 7
	40889 CY	4.680	1.857	30.229			36.766		

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1FBY 8	DEMOB. SLURRY EQUIP.	9927	2816	695			13438	.046	1FBY 8
	10 DA	992.700	281.600	69.500			1343.800		
1FBY 9	PLACE LAGGING 1ST.10FT	57770	5299	30444			93513	.317	1FBY 9
	40000 SF	1.444	.132	.761			2.338		
1FBY 10	CLEAN&PATCH SPTC WALL	70733	15869	5871			92473	.314	1FBY 10
	180 DA	392.961	88.161	32.617			513.739		
1FBY ITEM	GROUND SUPPORT WALL	1132000	680816	2672220			4485036	15.224	1FBY ITEM
	31111 SY	36.386	21.883	85.893			144.162		
1GFY 1	MOBILIZE & DEMOBILIZE	4098	2878	287			7263	.025	1GFY 1
	10 DA	409.800	287.800	28.700			726.300		
1GFY 2	INST. TIEBACK-LEVEL 2	435014	226430	346771			1008215	3.422	1GFY 2
	109000 LF	3.991	2.077	3.181			9.250		
1GFY 3	INSTALL WALE-LEVEL 2	89829	25309	63448			178586	.606	1GFY 3
	228 TON	393.987	111.004	278.281			783.272		
1GFY 4	INST. TIEBACK-LEVEL 3	175599	91402	270542			537543	1.825	1GFY 4
	88000 LF	1.995	1.039	3.074			6.108		
1GFY 5	INSTALL WALE-LEVEL 3	89829	25309	63448			178586	.606	1GFY 5
	228 TON	393.987	111.004	278.281			783.272		
1GFY 6	INST. TIEBACK-LEVEL 4	151653	78937	234556			465146	1.579	1GFY 6
	76000 LF	1.995	1.039	3.086			6.120		

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1GFY 7	INSTALL WALE-LEVEL 4	89859	25317	71490			186666	.634	1GFY 7
	255 TON	352.388	99.282	280.353			732.024		
1GFY 8	INST. TIEBACK-LEVEL 5	137687	71668	214693			424048	1.439	1GFY 8
	69000 LF	1.995	1.039	3.111			6.146		
1GFY 9	INSTALL WALE-LEVEL 5	90034	25367	67722			183123	.622	1GFY 9
	241 TON	373.585	105.257	281.004			759.846		
1GFY 10	INST. TIEBACK-LEVEL 6	125715	65437	196682			387834	1.316	1GFY 10
	63000 LF	1.995	1.039	3.122			6.156		
1GFY 11	INSTALL WALE-LEVEL 6	90034	25367	67722			183123	.622	1GFY 11
	241 TON	373.585	105.257	281.004			759.846		
1GFY 12	INST. TIEBACK-LEVEL 7	101769	52972	160714			315455	1.071	1GFY 12
	51000 LF	1.995	1.039	3.151			6.185		
1GFY 13	INSTALL WALE-LEVEL 7	89859	25317	71490			186666	.634	1GFY 13
	255 TON	352.388	99.282	280.353			732.024		
1GFY 14	REMOVE WALE STEEL	86753	31172	6073			123998	.421	1GFY 14
	1448 TON	59.912	21.528	4.194			85.634		
1GFY ITEM	BRACING - TIEBACK	1757732	772882	1835638			4366252	14.821	1GFY ITEM
	456000 LF	3.855	1.695	4.026			9.575		
1HFQ 1	BREAK PAVEMENT & HAUL	33808	14069	2367			50244	.171	1HFQ 1
	14400 SY	2.348	.977	.164			3.489		

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1HFQ 2	EXCAVATE FIRST 5 FT	130060	62830	9104			201994	.686	1HFQ 2
	24100 CY	5.397	2.607	.378			8.381		
1HFQ 3	EXCAVATE 5 TO 22 FT	208354	156579	14585			379518	1.288	1HFQ 3
	81900 CY	2.544	1.912	.178			4.634		
1HFQ 4	EXCAVATE 22 TO 70 FT	409857	520721	28690			959268	3.256	1HFQ 4
	231100 CY	1.774	2.253	.124			4.151		
1HFQ 5	FINE GRADE INVERT	61902	28391	4333			94626	.321	1HFQ 5
	14400 SY	4.299	1.972	.301			6.571		
1HFQ ITEM	EXCAVATION	843981	782590	59079			1685650	5.722	1HFQ ITEM
	337100 CY	2.504	2.322	.175			5.000		
1IBR 1	LEVELING SLAB FORMS	11966		3988			15954	.054	1IBR 1
	20 EA	598.300		199.400			797.700		
1IBR 2	POUR LEVELING SLAB	27040	2762	1893	45954		77649	.264	1IBR 2
	1580 CY	17.114	1.748	1.198	29.085		49.145		
1IBR 3	BASE SLAB REBAR,	415661	29730	29096	1112160		1586647	5.386	1IBR 3
	2648 TON	156.972	11.227	10.988	420.000		599.187		
1IBR 4	BASE SLAB BLKHDS&WK.FM	111766		12599			124365	.422	1IBR 4
	18680 SF	5.983		.674			6.658		
1IBR 5	BASE SLAB-POUR,CLEANUP	135204	13808	9464	1086006		1244481	4.224	1IBR 5
	35300 CY	3.830	.391	.268	30.765		35.254		

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1IBR 6	REBRACE ABOVE ROOFLINE	128890	37597	69522			236009	.801	1IBR 6
	1210 TON	106.521	31.072	57.456			195.049		
1IBR 7	PRESTRESS REBRACE	29689	692	2078			32459	.110	1IBR 7
	1210 TON	24.536	572	1.717			26.826		
1IBR 8	REMOVE REBRACE STEEL	41959	17623	2937			62519	.212	1IBR 8
	1210 TON	34.677	14.564	2.427			51.669		
1IBR 9	ASSEM.STL.WL&RF&PL FRM	21406	1947	164618			187971	.638	1IBR 9
	20 DA	1070.300	97.350	8230.900			9398.550		
1IBR 11	WALL REBAR	86571	5364	6060	175140		273135	.927	1IBR 11
	417 TON	207.604	12.863	14.532	420.000		655.000		
1IBR 12	MOVE & SET STEEL FORMS	423539		42198			465737	1.581	1IBR 12
	2000 LF	211.770		21.099			232.869		
1IBR 13	ROOF SLAB REBAR	343033	21255	24012	606480		994780	3.377	1IBR 13
	1444 TON	237.557	14.720	16.629	420.000		688.906		
1IBR 14	POUR WALLS & ROOF SLAB	135204	13808	9464	763587		922063	3.130	1IBR 14
	24820 CY	5.447	.556	.381	30.765		37.150		
1IBR 15	PLACE ROOF WATERPROOF					147600	147600	.501	1IBR 15
	14400 SY					10.250	10.250		
1IBR 16	MORTAR PROT.FOR W.P.	50902	7308	5243	61070		124523	.423	1IBR 16
	1584 CY	32.135	4.614	3.310	38.554		78.613		
1IBR 17	FORM PLENUM DECK	81576		8380			89956	.305	1IBR 17
	2000 LF	40.788		4.190			44.978		

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1IBR 18	PLEN.DECK REBAR	60160	2650	4211	76800		143821	.488	1IBR 18
	240 TON	250.667	11.042	17.546	320.000		599.254		
1IBR 19	POUR PLENUM DECK	55226	9466	3866	99674		168232	.571	1IBR 19
	3000 CY	18.409	3.155	1.289	33.225		56.077		
1IBR 20	CONST.PLENUM DIV. WALL	20218	1261	2105	12250		35834	.122	1IBR 20
	200 CY	101.090	6.305	10.525	61.250		179.170		
1IBR 21	ELECTRICAL EMBEDDED					230000	230000	.781	1IBR 21
1IBR 22	MECHANICAL EMBEDDED					105000	105000	.356	1IBR 22
1IBR 23	PATCH&POINT CONC.WORK	84847		5939	4900		95686	.325	1IBR 23
	416000 SF	.204		.014	.012		.230		
1IBR 24	CLEAN UP STRUCTURE	11829	662	828			13319	.045	1IBR 24
	20 DA	591.450	33.100	41.400			665.950		
1IBR ITEM	CONSTRUCT PERM.STRUCT.	2276686	165933	408501	4044020	482600	7377740	25.043	1IBR ITEM
	64900 CY	35.080	2.557	6.294	62.312	7.436	113.679		
1JFQ 1	BACKFILL & TAMP 2 FT	56256	2500	3938	38400		101094	.343	1JFQ 1
	9600 CY	5.860	.260	.410	4.000		10.531		
1JFQ 2	BACKFILL & TMP 2-34 FT	132818	45836	9297	616400		804351	2.730	1JFQ 2
	149300 CY	.890	.307	.062	4.129		5.387		
1JFQ 3	BACKFILL & TMP.TOP 5FT	163128	20264	11419	96400		291211	.988	1JFQ 3
	24100 CY	6.769	.841	.474	4.000		12.083		
1JFQ ITEM	BACKFILL	352202	68600	24654	751200		1196656	4.062	1JFQ ITEM
	183000 CY	1.925	.375	.135	4.105		6.539		

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1K00	1	PLACE 6IN SUBGRADE	13803	3800	966	16700		35269	.120	1K00 1
		13350 SY	1.034	.285	.072	1.251		2.642		
1K00	2	PLACE 4IN BASE COURSE	13803	3800	966	10680		29249	.099	1K00 2
		13350 SY	1.034	.285	.072	.800		2.191		
1K00	3	STREET PAVING					42343	42343	.144	1K00 3
		13350 SY					3.172	3.172		
1K00	5	BREAKOUT REM. SIDEWALK	13783	5736	965			20484	.070	1K00 5
		5870 SY	2.348	.977	.164			3.490		
1K00	6	BF&TMP.SIDEWALK VAULTS	66686	8283	4668	40000		119637	.406	1K00 6
		9852 CY	6.769	.841	.474	4.060		12.143		
1K00	7	PLACE 4IN SIDEWK.SUBGR	13416	3693	939	5200		23248	.079	1K00 7
		7785 SY	1.723	.474	.121	.668		2.986		
1K00	8	PLACE 4IN CONC.SIDEWLK	45719		4340	27307		77366	.263	1K00 8
		7785 SY	5.873		.557	3.508		9.938		
1K00	9	ACCESS WALKWAY	18663	1325	5554			25542	.087	1K00 9
		40 DA	466.575	33.125	138.850			638.550		
1K00	ITEM	STREET RESTORATION	185873	26637	18398	99887	42343	373138	1.267	1K00 ITEM
		13350 SY	13.923	1.995	1.378	7.482	3.172	27.950		
1N00	1	FIXED EXPENSE	67200	30000	231204			328404	1.115	1N00 1
1N00	ITEM	OVERHEAD-FIXED COSTS	67200	30000	231204			328404	1.115	1N00 ITEM

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1OKQ	1	OVERHEAD LABOR	1135400		79478			1214878	4.124	1OKQ 1
		36 MO	31538.889		2207.722			33746.611		
1OKQ	2	OVERHEAD EXPENSES			379800			379800	1.289	1OKQ 2
		36 MO			10550.000			10550.000		
1OKQ	3	GENERAL SERVICE CREW	966402	82138	67648			1116188	3.789	1OKQ 3
		640 DA	1510.003	128.341	105.700			1744.044		
1OKQ	4	VEHICLE OPERATION		36000				36000	.122	1OKQ 4
		36 MO		1000.000				1000.000		
1OKQ	ITEM	OVERHEAD-TIME RELATED	2101802	118138	526926			2746866	9.324	1OKQ ITEM
		36 MO	58383.389	3281.611	14636.833			76301.833		
1P00	1	FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	.700	1P00 1
1P00	ITEM	PLANT-FIXED COSTS	82760	25000	79793		18800	206353	.700	1P00 ITEM
1QKQ	1	TIME RELATED COSTS			185100			185100	.628	1QKQ 1
		36 MO			5141.667			5141.667		
1QKQ	ITEM	PLANT-TIME RELATED			185100			185100	.628	1QKQ ITEM
		36 MO			5141.667			5141.667		

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

DOT 3-1KY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	10025265	2969113	8186201	4926086	3354063	29460728	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 2-2GZ

RAPID TRANSIT STATION
SITE 2 - 70' DEPTH
SOLDIER PILE & LAGGING GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

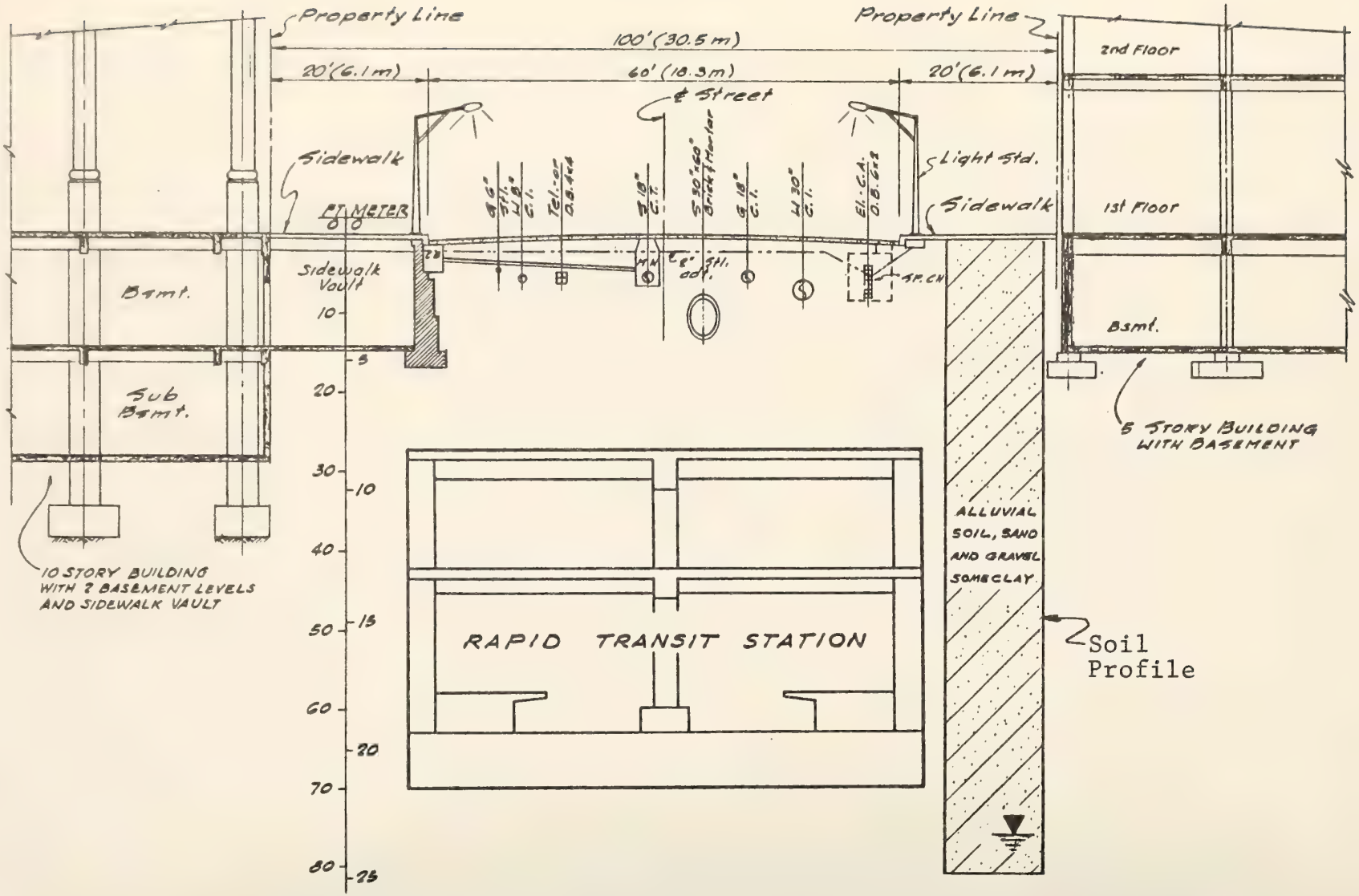


Figure 5. PROJECT 2-2GZ - TRANSIT STATION
SITE 2 - 70' DEPTH
SOLDIER PILES & LAGGING - INTERNAL BRACING

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT

DOT 2-2GZ

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	5954449	901686	3191051	2414417	751356	13212959	100.000
PROJECT						13212959	100.000

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

			TOTAL COST ANALYSIS			PROJECT SUMMARY				
			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2A00	1	CONST BARRICADES,ETC	18779	518	12245			31542	.239	2A00 1
		20 DA	938.950	25.900	612.250			1577.100		
2A00	2	SET & MOVE BARRIC,ETC	19205	1812	3514			24531	.186	2A00 2
		30 DA	640.167	60.400	117.133			817.700		
2A00	3	FLAGMEN-DIRECT TRAFFIC	38680		2708			41388	.313	2A00 3
		250 DA	154.720		10.832			165.552		
2A00	ITEM	TRAFFIC CONTROL	76664	2330	18467			97461	.738	2A00 ITEM
2BA1	1	ALL OPERATIONS	65181	6326	66321	2000	422964	562792	4.259	2BA1 1
2BA1	ITEM	UTILLTY WORK-ALTERNATE	65181	6326	66321	2000	422964	562792	4.259	2BA1 ITEM
2CAQ	1	GENL EXTERIOR PROTECT	8063	2608	3396			14067	.106	2CAQ 1
		15 DA	537.533	173.867	226.400			937.800		
2CAQ	2	SIDEWALK VAULTS &WALLS	32970	6310	7798	8133		55211	.418	2CAQ 2
		350 LF	94.200	18.029	22.280	23.237		157.746		
2CAQ	3	CONTROL PIERS	28421	2928	14134			45483	.344	2CAQ 3
		18 EA	1578.944	162.667	785.222			2526.833		
2CAQ	6	UNDERPIN-PREP FTGS&CON	107884	11620	46045			165549	1.253	2CAQ 6
		18 EA	5993.556	645.556	2558.056			9197.167		
2CAQ	7	UNDERPIN-JACK PILES	226714	988	44772			272474	2.062	2CAQ 7
		108 EA	2099.204	9.148	414.556			2522.907		

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

			TOTAL COST ANALYSIS			PROJECT SUMMARY				
			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2CAQ	8	UNDERPIN-PREP FTGS&CON	107884	11620	46045			165549	1.253	2CAQ 8
		18 EA	5993.556	645.556	2558.056			9197.167		
2CAQ	9	UNDERPIN-JACK PILES	170036	741	61205			231982	1.756	2CAQ 9
		108 EA	1574.407	6.861	566.713			2147.981		
2CAQ	ITEM	PROTECT ADJ STRUCTURES	681972	36815	223395	8133		950315	7.192	2CAQ ITEM
2E00	1	CENTER PILE EXPL HOLE	5303	744	371			6418	.049	2E00 1
		60 EA	88.383	12.400	6.183			106.967		
2E00	2	DRILL HOLES-CENTR PILE	20036	23728	2523			46287	.350	2E00 2
		60 EA	333.933	395.467	42.050			771.450		
2E00	3	PLACE&SPLICE CEN.PILES	14599	5380	48762			68741	.520	2E00 3
		60 EA	243.317	89.667	812.700			1145.683		
2E00	5	BACKFILL PILE HOLES	5276	1324	5886			12486	.094	2E00 5
		60 EA	87.933	22.067	98.100			208.100		
2E00	6	PILE CAPS,WALES,DECKBM	79696	17460	337079			434235	3.286	2E00 6
		663 TON	120.205	26.335	508.415			654.955		
2E00	7	LATERAL & SWAY BRACING	25722	4617	36801			67140	.508	2E00 7
		50 TON	514.440	92.340	736.020			1342.800		
2E00	8	DECK MATS & TIMBERS	22084	1631	189391			213106	1.613	2E00 8
		5367 SY	4.115	.304	35.288			39.707		
2E00	9	REPOST DECK SUPPORT	28981	8978	6529			44488	.337	2E00 9
		60 EA	483.017	149.633	108.817			741.467		

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2E00 11	REMOVE TIMBER DECKING	12343	1907	864			15114	.114	2E00 11
	5367 SY	2.300	.355	.161			2.816		
2E00 12	REMOVE DECK BEAMS	27502	11753	1925			41180	.312	2E00 12
	622 TON	44.215	18.895	3.095			66.206		
2E00 13	REMOVE WALES & CAPS	11884	5079	832			17795	.135	2E00 13
	168 TON	70.738	30.232	4.952			105.923		
2E00 14	REM.LAG.& PILES TO -6	11139	3014	780			14933	.113	2E00 14
	1400 LF	7.956	2.153	.557			10.666		
2E00 ITEM	STREET DECKING	264565	85615	631743			981923	7.432	2E00 ITEM
	5367 SY	49.295	15.952	117.709			182.956		
2FAQ 1	TRENCH FOR SOLD PILES	30927	4340	4365			39632	.300	2FAQ 1
	1400 LF	22.091	3.100	3.118			28.309		
2FAQ 2	DRILL HOLES FOR PILES	30120	35673	7183			72976	.552	2FAQ 2
	14432 LF	2.087	2.472	.498			5.057		
2FAQ 3	SPLICE,PLACE,TRIM PILE	35685	13152	262758			311595	2.358	2FAQ 3
	176 EA	202.756	74.727	1492.943			1770.426		
2FAQ 4	BACKFILL PILE HOLES	11609	2912	16123			30644	.232	2FAQ 4
	176 EA	65.960	16.545	91.608			174.114		
2FAQ 5	PLACE LAGGING	117936	10818	88336			217090	1.643	2FAQ 5
	98000 SF	1.203	.110	.901			2.215		

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2FAQ 21	END BULKHEADS	21231	6066	34849			62146	.470	2FAQ 21
	1011 SY	21.000	6.000	34.470			61.470		
2FAQ ITEM	GROUND SUPPORT WALL	247508	72961	413614			734083	5.556	2FAQ ITEM
	11900 SY	20.799	6.131	34.757			61.688		
2GEQ 1	BRACING LEVEL 2	40200	11726	178314			230240	1.743	2GEQ 1
	351 TON	114.530	33.407	508.017			655.954		
2GEQ 2	PRESTRESS LEVEL 2	18519	432	1296			20247	.153	2GEQ 2
	351 TON	52.761	1.231	3.692			57.684		
2GEQ 3	BRACING LEVEL 3	87240	25448	6107	573300		692095	5.238	2GEQ 3
	819 TON	106.520	31.072	7.457	700.000		845.049		
2GEQ 4	PRESTRESS LEVEL 3	20095	468	1407			21970	.166	2GEQ 4
	819 TON	24.536	.571	1.718			26.825		
2GEQ 5	BRACING LEVEL 4	44738	13050	3132	235200		296120	2.241	2GEQ 5
	336 TON	133.149	38.839	9.321	700.000		881.310		
2GEQ 6	PRESTRESS LEVEL 4	10306	240	721			11267	.085	2GEQ 6
	336 TON	30.673	.714	2.146			33.533		
2GEQ 7	BRACING LEVEL 5	37452	10924	108122			156498	1.184	2GEQ 7
	211 TON	177.498	51.773	512.427			741.697		
2GEQ 8	PRESTRESS LEVEL 5	8627	201	604			9432	.071	2GEQ 8
	211 TON	40.886	.953	2.863			44.701		

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2GEQ 9	REMOVE BRAC.LEVEL 5	11237	3278	787			15302	.116	2GEQ 9
	211 TON	53.256	15.536	3.730			72.521		
2GEQ 12	REMOVE BRAC.LEVEL 2	18695	5454	1309			25458	.193	2GEQ 12
	351 TON	53.262	15.538	3.729			72.530		
2GEQ 21	END BULKHEAD BRACING	29410	7310	43179	64260		144159	1.091	2GEQ 21
	170 TON	173.000	43.000	253.994	378.000		847.994		
2GEQ ITEM	INTERNAL BRACING	326519	78531	344978	872760		1622788	12.282	2GEQ ITEM
	1717 TON	190.168	45.737	200.919	508.305		945.130		
2HEQ 1	BREAK PAVEMENT & HAUL	11973	4983	838			17794	.135	2HEQ 1
	5100 SY	2.348	.977	.164			3.489		
2HEQ 2	EXCAVATE 1ST. 5 FT.	45331	21899	3173			70403	.533	2HEQ 2
	8400 CY	5.397	2.607	.378			8.381		
2HEQ 3	EXCAVATE 5 TO 22 FT	72759	54678	5093			132530	1.003	2HEQ 3
	28600 CY	2.544	1.912	.178			4.634		
2HEQ 4	EXCAVATE 22 TO 30 FT	33215	35814	2325			71354	.540	2HEQ 4
	13500 CY	2.460	2.653	.172			5.285		
2HEQ 5	EXCAVATE 30 TO 50 FT	71722	91122	5021			167865	1.270	2HEQ 5
	33700 CY	2.128	2.704	.149			4.981		
2HEQ 6	EXCAVATE 50 TO 70 FT	79682	101235	5578			186495	1.411	2HEQ 6
	33700 CY	2.364	3.004	.166			5.534		

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2HEQ 7	FINE GRADE INVERT	21923	10054	4085			36062	.273	2HEQ 7
	5100 SY	4.299	1.971	.801			7.071		
2HEQ ITEM	EXCAVATION	336605	319785	26113			682503	5.165	2HEQ ITEM
	117900 CY	2.855	2.712	.221			5.789		
2IAR 1	LEVELING SLAB FORMS	8377		3526			11903	.090	2IAR 1
	14 EA	598.357		251.857			850.214		
2IAR 2	POUR LEVELING SLAB	18929	1933	1325	15789		37976	.287	2IAR 2
	539 CY	35.119	3.586	2.458	29.293		70.456		
2IAR 3	BASE SLAB REBAR	98724	7061	6911	257460		370156	2.801	2IAR 3
	613 TON	161.051	11.519	11.274	420.000		603.843		
2IAR 4	BASE SLAB BULKHEADS	35953		5113			41066	.311	2IAR 4
	6370 SF	5.644		.803			6.447		
2IAR 5	BASE SLAB-POUR,CLEANUP	75702	7731	5299	246413		335145	2.536	2IAR 5
	8169 CY	9.267	.946	.649	30.164		41.026		
2IAR 21	FORM COLUMN PEDESTAL	7180		1617			8797	.067	2IAR 21
	2436 SF	2.947		.664			3.611		
2IAR 22	COL PEDESTAL REBAR	3008	265	211	5040		8524	.065	2IAR 22
	12 TON	250.667	22.083	17.583	420.000		710.333		
2IAR 23	POUR COL PED& CLEANUP	2974	208	208	4776		8166	.062	2IAR 23
	158 CY	18.823	1.316	1.316	30.228		51.684		

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2IAR 31	ASSEM TRACK WALL FORMS	10704	973	37349			49026	.371	2IAR 31
	10 DA	1070.400	97.300	3734.900			4902.600		
2IAR 33	WALL & COLUMN REBAR	38933	2785	2725	77700		122143	.924	2IAR 33
	185 TON	210.449	15.054	14.730	420.000		660.232		
2IAR 34	MOVE&SET TRACK WALL FM	57710		9090			66800	.506	2IAR 34
	700 LF	82.443		12.986			95.429		
2IAR 35	POUR TRACK WL CONC&CLN	39533	4038	2767	74715		121053	.916	2IAR 35
	2471 CY	15.999	1.634	1.120	30.237		48.989		
2IAR 36	ENDWALL CONC-TRACK LVL	11308	771	2848	15677		30604	.232	2IAR 36
	257 CY	44.000	3.000	11.082	61.000		119.082		
2IAR 41	ASSEM MEZZ SLAB FORM	16055	1460	81924			99439	.753	2IAR 41
	15 DA	1070.333	97.333	5461.600			6629.267		
2IAR 42	MOVE & SET MEZZ FORMS	57710		5740			63450	.480	2IAR 42
	700 LF	82.443		8.200			90.643		
2IAR 43	MEZZ SLAB REBAR	41621	2977	2913	80220		127731	.967	2IAR 43
	191 TON	217.911	15.586	15.251	420.000		668.749		
2IAR 44	POUR MEZZ SLAB	39222	4006	2746	76766		122740	.929	2IAR 44
	2541 CY	15.436	1.577	1.081	30.211		48.304		
2IAR 51	MOVE&REASSEMBLE WL FMS	10704	973	5749			17426	.132	2IAR 51
	10 DA	1070.400	97.300	574.900			1742.600		
2IAR 53	WALL & COLUMN REBAR	27654	1978	1936	47040		78608	.595	2IAR 53
	112 TON	246.911	17.661	17.286	420.000		701.857		

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2IAR 54	MOVE&SET MEZZ WALL FMS	57710		8460			66170	.501	2IAR 54
	700 LF	82.443		12.086			94.529		
2IAR 55	POUR MEZZ WL CONC &CLN	37790	3859	2645	45122		89416	.677	2IAR 55
	1498 CY	25.227	2.576	1.766	30.121		59.690		
2IAR 56	ENDWALL CONC-MEZZ LEVL	7964	543	2005	11041		21553	.163	2IAR 56
	181 CY	44.000	3.000	11.077	61.000		119.077		
2IAR 61	ASSEM ROOF SLAB FORM	16055	1460	36924			54439	.412	2IAR 61
	15 DA	1070.333	97.333	2461.600			3629.267		
2IAR 62	MOVE & SET ROOF FORMS	57710		5100			62810	.475	2IAR 62
	700 LF	82.443		7.286			89.729		
2IAR 63	ROOF SLAB REBAR	52067	3724	3645	106260		165696	1.254	2IAR 63
	253 TON	205.798	14.719	14.407	420.000		654.925		
2IAR 64	POUR ROOF SLAB	37872	3867	2651	101671		146061	1.105	2IAR 64
	3367 CY	11.248	1.149	.787	30.196		43.380		
2IAR 65	PLACE ROOF WATERPROOF					52275	52275	.396	2IAR 65
	5100 SY					10.250	10.250		
2IAR 66	MORTAR PROT. FOR W.P.	18009	2586	1891	21402		43888	.332	2IAR 66
	556 CY	32.390	4.651	3.401	38.493		78.935		
2IAR 71	FORM STA PLATFORM	82628		29104			111732	.846	2IAR 71
	33000 SF	2.504		.882			3.386		
2IAR 72	STA.PLATFORM REBAR	26886		1882	50400		79168	.599	2IAR 72
	120 TON	224.050		15.683	420.000		659.733		

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2IAR 73	POUR STA PLATFORM	11114	238	778	49517		61647	.467	2IAR 73
	1610 CY	6.903	.148	.483	30.756		38.290		
2IAR 74	FORM STATION STAIRWAYS	11966		3350			15316	.116	2IAR 74
	2400 SF	4.986		1.396			6.382		
2IAR 75	STATION STAIRWAY REBAR	2023		142	1680		3845	.029	2IAR 75
	4 TON	505.750		35.500	420.000		961.250		
2IAR 76	POUR STATION STAIRWAYS	4142	355	290	1465		6252	.047	2IAR 76
	48 CY	86.292	7.396	6.042	30.521		130.250		
2IAR 78	TRACK INVERT FILL CONC	12620	1795	1513	21536		37464	.284	2IAR 78
	700 CY	18.029	2.564	2.161	30.766		53.520		
2IAR 81	ELECTRICAL-EMBEDDED					125000	125000	.946	2IAR 81
2IAR 82	MECHANICAL-EMBEDDED					75000	75000	.568	2IAR 82
2IAR 83	MISC METALS					37500	37500	.284	2IAR 83
2IAR 91	PATCH&POINT-FORM SURF	38467		2693	2208		43368	.328	2IAR 91
	188600 SF	.204		.014	.012		.230		
2IAR 92	CLEANUP STRUCTURE	8872	497	621			9990	.076	2IAR 92
	15 DA	591.467	33.133	41.400			666.000		
2IAR ITEM	CONSTRUCT PERM STRUCT	1085896	56083	283691	1313898	289775	3029343	22.927	2IAR ITEM
	21542 CY	50.408	2.603	13.169	60.992	13.452	140.625		

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2JEQ	1	BACKFILL & TAMP.2 FT.	19924	885	1395	13600		35804	.271	2JEQ 1
		3400 CY	5.860	.260	.410	4.000		10.531		
2JEQ	2	BCKFILL&TMP.2-22 FT.	76040	9445	5323	134800		225608	1.707	2JEQ 2
		33700 CY	2.256	.280	.158	4.000		6.695		
2JEQ	3	BAKFILL&TMP.LAST 5 FT.	56858	7062	3980	33600		101500	.768	2JEQ 3
		8400 CY	6.769	.841	.474	4.000		12.083		
2JEQ	ITEM	BACKFILL	152822	17392	10698	182000		362912	2.747	2JEQ ITEM
		45500 CY	3.359	.382	.235	4.000		7.976		
2K00	1	STREET:6 IN SUBGRADE	4829	1330	338	5850		12347	.093	2K00 1
		4667 SY	1.035	.285	.072	1.253		2.646		
2K00	2	STREET:4 IN BASE AC	4829	1330	338	3750		10247	.078	2K00 2
		4667 SY	1.035	.285	.072	.804		2.196		
2K00	3	STREET PAVING					14817	14817	.112	2K00 3
		4667 SY					3.175	3.175		
2K00	5	BREAK-OUT REM.SIDEWALK	5001	2081	350			7432	.056	2K00 5
		2130 SY	2.348	.977	.164			3.489		
2K00	6	BKFL&TMP S/W VAULTS	23014	2858	1611	14000		41483	.314	2K00 6
		3400 CY	6.769	.841	.474	4.118		12.201		
2K00	7	SIDEWALK:4 IN.SUBGRADE	4869	1340	341	1900		8450	.064	2K00 7
		2825 SY	1.724	.474	.121	.673		2.991		

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2K00	8	SIDEWALK:POUR 4IN.CONC	16592		2154	10126		28872	.219	2K00 8
		2825 SY	5.873		.762	3.584		10.220		
2K00	9	ACCESS WALKWAYS	7465	530	2441			10436	.079	2K00 9
		16 DA	466.563	33.125	152.563			652.250		
2K00	ITEM	RESTORATION	66599	9469	7573	35626	14817	134084	1.015	2K00 ITEM
2N00	1	FIXED EXPENSE	100800	46000	211056			357856	2.708	2N00 1
2N00	ITEM	OVERHEAD-FIXED COSTS	100800	46000	211056			357856	2.708	2N00 ITEM
20GQ	1	OVERHEAD LABOR	1433000		100310			1533310	11.605	20GQ 1
		37 MO	38729.730		2711.081			41440.811		
20GQ	2	OVERHEAD EXPENSES			442500			442500	3.349	20GQ 2
		37 MO			11959.459			11959.459		
20GQ	3	GENERAL SERVICE CREW	996598	84704	69762			1151064	8.712	20GQ 3
		660 DA	1509.997	128.339	105.700			1744.036		
20GQ	4	VEHICLE OPERATION		43475				43475	.329	20GQ 4
		37 MO		1175.000				1175.000		
20GQ	ITEM	OVERHEAD-TIME RELATED	2429598	128179	612572			3170349	23.994	20GQ ITEM
		37 MO	65664.811	3464.297	16556.000			85685.108		
2P00	1	FIXED PLANT EXPENSES	119720	29000	117480		23800	290000	2.195	2P00 1
2P00	ITEM	PLANT-FIXED COSTS	119720	29000	117480		23800	290000	2.195	2P00 ITEM

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2QGQ 1	PLANT-TIME RELATED		13200	223350			236550	1.790	2QGQ 1
	37 MO		356.757	6036.486			6393.243		
2QGQ ITEM	PLANT-TIME RELATED		13200	223350			236550	1.790	2QGQ ITEM
	37 MO		356.757	6036.486			6393.243		

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	5954449	901686	3191051	2414417	751356	13212959	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 4-2JY

RAPID TRANSIT STATION
SITE 4 - 70' DEPTH
CAST-IN-SLURRY CONCRETE (SPTC) GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

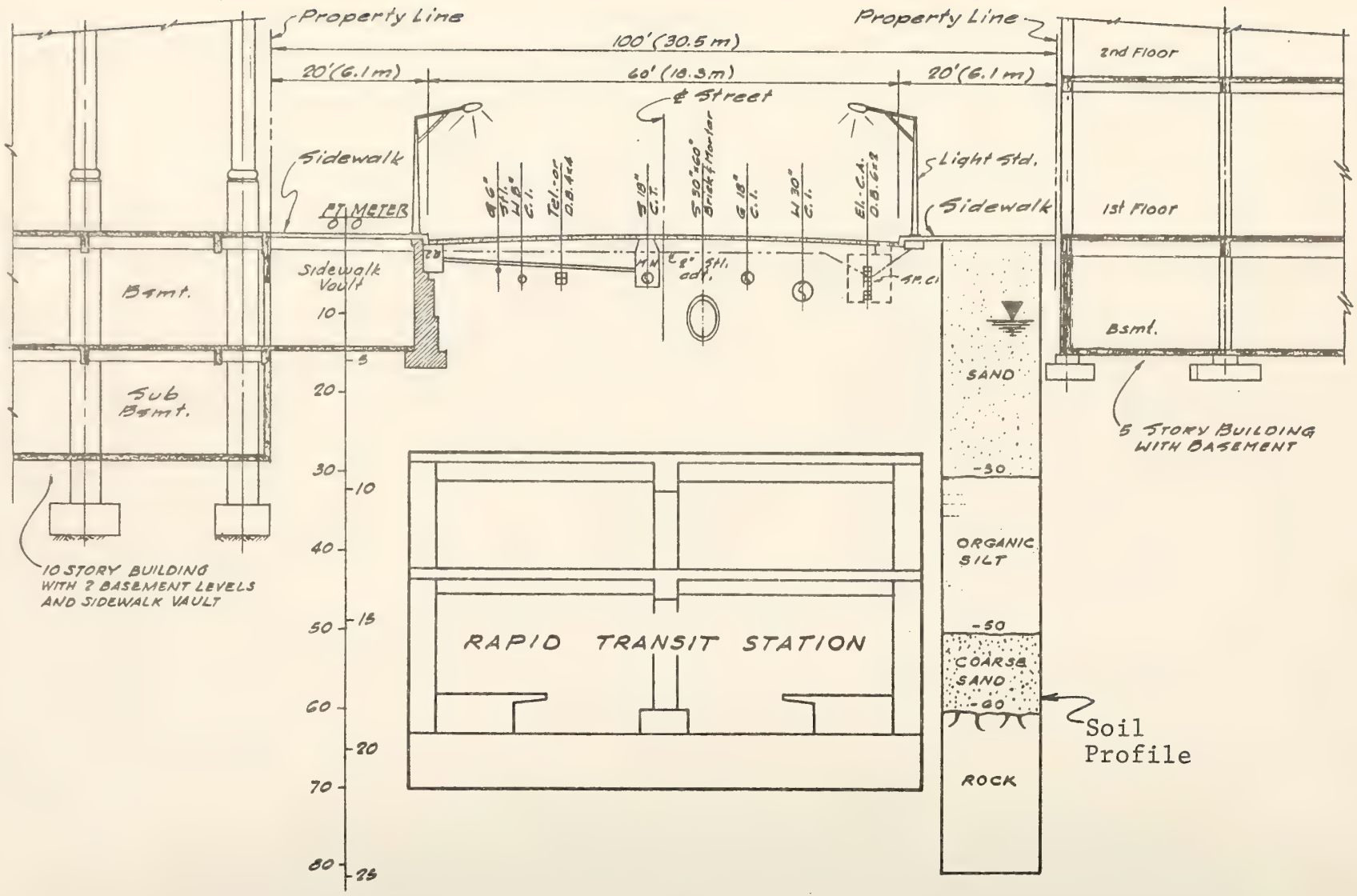


Figure 6. PROJECT 4-2JY - TRANSIT STATION
SITE 4 - 70' DEPTH
CAST-IN-SLURRY (SPTC) - INTERNAL BRACING

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6418224	1255798	3520567	2644679	886299	14725567	100.000
PROJECT						14725567	100.000

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2A00 1	CONST BARRICADES,ETC	18779	518	12245			31542	.214	2A00 1
	20 DA	938.950	25.900	612.250			1577.100		
2A00 2	SET & MOVE BARRIC,ETC	19205	1812	3514			24531	.167	2A00 2
	30 DA	640.167	60.400	117.133			817.700		
2A00 3	FLAGMEN-DIRECT TRAFFIC	41774		2924			44698	.304	2A00 3
	270 DA	154.719		10.830			165.548		
2A00 ITEM	TRAFFIC CONTROL	79758	2330	18683			100771	.684	2A00 ITEM
2BD0 21	UTILITY SUPPORT LONG.	31285	3864	30919			66068	.449	2BD0 21
	700 LF	44.693	5.520	44.170			94.383		
2BD0 22	UTILITY SUPPORT INTER.	10301	530	8107			18938	.129	2BD0 22
	1 EA								
2BD0 23	STORM DR&SEW.TEMP.LONG	15644	1932	13695			31271	.212	2BD0 23
	1400 LF	11.174	1.380	9.782			22.336		
2BD0 24	STORM DR&SEW.PERM.LONG					63000	63000	.428	2BD0 24
	1400 LF					45.000	45.000		
2BD0 26	SEWER PERM. LONGITUD.					17220	17220	.117	2BD0 26
	1400 LF					12.300	12.300		
2BD0 28	SEW. 18IN PERM. INTER.					1845	1845	.013	2BD0 28
	1 EA								
2BD0 30	STM.DR.LATER.PERM.LONG					600	600	.004	2BD0 30
	2 EA					300.000	300.000		

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2BD0 32	STM.DR.LATER.PERM.INT.					600	600	.004	2BD0 32
	2 EA					300.000	300.000		
2BD0 33	BLDG.SEW.LATERALS PERM					1415	1415	.010	2BD0 33
	21 EA					67.381	67.381		
2BD0 35	MANHOLES SEW.PERM.LONG					2300	2300	.016	2BD0 35
	2 EA					1150.000	1150.000		
2BD0 37	MANHOLES SEW.PERM.INT.					1150	1150	.008	2BD0 37
	1 EA								
2BD0 38	CATCH BASINS LONGIT.					1900	1900	.013	2BD0 38
	2 EA					950.000	950.000		
2BD0 39	CATCH BASINS INTER.					1900	1900	.013	2BD0 39
	2 EA					950.000	950.000		
2BD0 40	DIVERT 18IN SEWER INT.					13976	13976	.095	2BD0 40
	1 EA								
2BD0 41	WAT.MAIN 30IN CI LONG.					70000	70000	.475	2BD0 41
	700 LF					100.000	100.000		
2BD0 42	WATER 8IN LONGITUDINAL					24605	24605	.167	2BD0 42
	700 LF					35.150	35.150		
2BD0 43	WATER 8IN INTERSECTION					5954	5954	.040	2BD0 43
	1 EA								
2BD0 44	RELOCATE FIRE HYD.LONG					2500	2500	.017	2BD0 44
	1 EA								

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2BD0 45	RELOCATE FIRE HYD.INT.					5000	5000	.034	2BD0 45
	2 EA					2500.000	2500.000		
2BD0 46	DIVERT 8IN WATER INTER					1553	1553	.011	2BD0 46
	1 EA								
2BD0 51	GAS MAIN TEMP.LONG.					52500	52500	.357	2BD0 51
	700 LF					75.000	75.000		
2BD0 52	GAS MAIN.PERM.LONG.					31500	31500	.214	2BD0 52
	700 LF					45.000	45.000		
2BD0 53	GAS LINE 6IN.INTERSECT					2036	2036	.014	2BD0 53
	1 EA								
2BD0 54	GAS LINE 6IN TEMP.LONG					40005	40005	.272	2BD0 54
	700 LF					57.150	57.150		
2BD0 55	GAS LINE 6IN LONGITUD.					19005	19005	.129	2BD0 55
	700 LF					27.150	27.150		
2BD0 56	DIVERT 6IN GAS INTER.					6710	6710	.046	2BD0 56
	1 EA								
2BD0 61	TELEPH.4X4 DUCT LONGIT					20475	20475	.139	2BD0 61
	700 LF					29.250	29.250		
2BD0 62	TELEPH.4X4 DUCT INTER.					2194	2194	.015	2BD0 62
	1 EA								
2BD0 63	TELEPHONE MANHOLE LONG					9990	9990	.068	2BD0 63
	1 EA								

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2BD0 64	TELEPHONE MANHOLE INT. 1 EA					9990	9990	.068	2BD0 64
2BD0 65	DIVERT TEL.DUCT INTER. 1 EA					42803	42803	.291	2BD0 65
2BD0 71	ELECT DUCT BK.2X6 LONG 700 LF			11731 16.759			11731 16.759	.080	2BD0 71
2BD0 72	ELECT.DUCT 2X6 INTER. 1 EA			1313			1313	.009	2BD0 72
2BD0 73	ST.LT&TR.SIG.COND.INT. 1 EA					4750	4750	.032	2BD0 73
2BD0 74	STREET LIGHT TEMP.LONG 8 EA	533 66.625		37 4.625			570 71.250	.004	2BD0 74
2BD0 75	STREET LIGHT PERM.LONG 8 EA	533 66.625		37 4.625		1680 210.000	2250 281.250	.015	2BD0 75
2BD0 76	TR.SIG.CONTRL.TEMP INT 1 EA				2000		2000	.014	2BD0 76
2BD0 77	TR.SIG.CONTRL.PERM INT 1 EA					150	150	.001	2BD0 77
2BD0 78	PED.&TRAFFIC SIG.PERM. 1 EA					1200	1200	.008	2BD0 78
2BD0 79	DIVERT ELECT DUCT INT. 1 EA					25750	25750	.175	2BD0 79

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2BD0 80	DIVERT BLDG.LATER LONG					63000	63000	.428	2BD0 80
	21 EA					3000.000	3000.000		
2BD0 81	REMOVE UTILITIES SUPP.	6885		482			7367	.050	2BD0 81
	700 LF	9.836		.689			10.524		
2BD0 ITEM	UTILITY WORK	65181	6326	66321	2000	549256	689084	4.680	2BD0 ITEM
2CD0 1	GENL EXTERIOR PROTECT	8063	2608	3396			14067	.096	2CD0 1
	15 DA	537.533	173.867	226.400			937.800		
2CD0 2	SIDEWALK VAULTS &WALLS	32970	6310	7798	8133		55211	.375	2CD0 2
	350 LF	94.200	18.029	22.280	23.237		157.746		
2CD0 ITEM	PROTECT ADJ STRUCTURES	41033	8918	11194	8133		69278	.470	2CD0 ITEM
2DDY 1	TRENCH & SUMP-EXCAV.	89337	18288	11504			119129	.809	2DDY 1
	180 DAY	496.317	101.600	63.911			661.828		
2DDY 2	CONSTR INVERT SUMPS	5419	839	792			7050	.048	2DDY 2
	2 EA	2709.500	419.500	396.000			3525.000		
2DDY 3	PUMPING FROM SUMPS	230999	34636	16170			281805	1.914	2DDY 3
	480 DAY	481.248	72.158	33.688			587.094		
2DDY ITEM	CONTROL GROUNDWATER	325755	53763	28466			407984	2.771	2DDY ITEM
2E00 1	CENTER PILE EXPL HOLE	5303	744	371			6418	.044	2E00 1
	60 EA	88.383	12.400	6.183			106.967		

' TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2E00 2	DRILL HOLES-CENTR PILE	20036	23728	2523			46287	.314	2E00 2
	60 EA	333.933	395.467	42.050			771.450		
2E00 3	DRILL HOLES IN ROCK	24441	21487	6661			52589	.357	2E00 3
	60 EA	407.350	358.117	111.017			876.483		
2E00 4	PLACE&SPLICE CEN.PILES	14599	5380	48762			68741	.467	2E00 4
	60 EA	243.317	89.667	812.700			1145.683		
2E00 5	BACKFILL PILE HOLES	5276	1324	5886			12486	.085	2E00 5
	60 EA	87.933	22.067	98.100			208.100		
2E00 6	PILE CAPS,WALES,DECKBM	83084	18202	357316			458602	3.114	2E00 6
	703 TON	118.185	25.892	508.273			652.350		
2E00 7	LATERAL & SWAY BRACING	25722	4617	36801			67140	.456	2E00 7
	50 TON	514.440	92.340	736.020			1342.800		
2E00 8	DECK MATS & TIMBERS	26170	1933	208717			236820	1.608	2E00 8
	5911 SY	4.427	.327	35.310			40.064		
2E00 9	REPOST DECK SUPPORT	28981	8978	6529			44488	.302	2E00 9
	60 EA	483.017	149.633	108.817			741.467		
2E00 11	REMOVE TIMBER DECKING	13202	2039	924			16165	.110	2E00 11
	5911 SY	2.233	.345	.156			2.735		
2E00 12	REMOVE DECK BEAMS	32096	13716	2247			48059	.326	2E00 12
	726 TON	44.209	18.893	3.095			66.197		
2E00 13	REMOVE WALES & CAPS	11109	4748	778			16635	.113	2E00 13
	157 TON	70.758	30.242	4.955			105.955		

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2E00 14	REM.LAG.& PILES TO -6	11139	3014	780			14933	.101	2E00 14
	1400 LF	7.956	2.153	.557			10.666		
2E00 ITEM	STREET DECKING	301158	109910	678295			1089363	7.398	2E00 ITEM
	5911 SY	50.949	18.594	114.751			184.294		
2FBY 1	MOB.SLURRY PLT.&EQUIP.	17083	30490	1196			48769	.331	2FBY 1
	30 DA	569.433	1016.333	39.867			1625.633		
2FBY 2	TRENCH @ WALL LOCATION	30927	4340	4365			39632	.269	2FBY 2
	1400 LF	22.091	3.100	3.118			28.309		
2FBY 3	DRILL PILE HOLES-EARTH	18754	22210	1313			42277	.287	2FBY 3
	7020 LF	2.672	3.164	.187			6.022		
2FBY 4	DRILL FOR PILES-ROCK	23830	20951	4242			49023	.333	2FBY 4
	234 EA	101.838	89.534	18.128			209.500		
2FBY 5	SPLICE,PLACE,TRIM PILE	47448	17488	303181			368117	2.500	2FBY 5
	234 EA	202.769	74.735	1295.645			1573.150		
2FBY 6	EXCAV. BETWEEN PILES	53785	68698	3765			126248	.857	2FBY 6
	9333 CY	5.763	7.361	.403			13.527		
2FBY 7	OPERATE SLURRY EQUIP.	52368	11827	32716			96911	.658	2FBY 7
	120 SH	436.400	98.558	272.633			807.592		
2FBY 8	PLACE TREMIE CONC.	37109	14726	235301			287136	1.950	2FBY 8
	7777 CY	4.772	1.894	30.256			36.921		

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2FBY 9	DEMOB. SLURRY EQUIP.	9927	2816	695			13438	.091	2FBY 9
	10 DA	992.700	281.600	69.500			1343.800		
2FBY 10	PLACE LAGGING 1ST.10FT	20219	1855	10655			32729	.222	2FBY 10
	14000 SF	1.444	.133	.761			2.338		
2FBY 11	CLEAN&PATCH SPTC WALL	78592	17632	5849			102073	.693	2FBY 11
	200 DA	392.960	88.160	29.245			510.365		
2FBY 12	GROUT WALL-ROCK SEAL	8687	4124	23166			35977	.244	2FBY 12
	1400 LF	6.205	2.946	16.547			25.698		
2FBY 13	ROCK FACE STABILIZED	37094	4603	33796			75493	.513	2FBY 13
	1556 SY	23.839	2.958	21.720			48.517		
2FBY 21	STATION END BULKHEADS	40815	20861	69068			130744	.888	2FBY 21
	907 SY	45.000	23.000	76.150			144.150		
2FBY ITEM	GROUND SUPPORT WALL	476638	242621	729308			1448567	9.837	2FBY ITEM
	10240 SY	46.547	23.693	71.221			141.462		
2GEQ 1	BRACING LEVEL 2	42395	12367	201968			256730	1.743	2GEQ 1
	398 TON	106.520	31.073	507.457			645.050		
2GEQ 2	PRESTRESS LEVEL 2	19530	455	1367			21352	.145	2GEQ 2
	398 TON	49.070	1.143	3.435			53.648		
2GEQ 3	BRACING LEVEL 3	94696	27623	6629	622300		751248	5.102	2GEQ 3
	889 TON	106.520	31.072	7.457	700.000		845.048		

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2GEQ 4	PRESTRESS LEVEL 3	21812	509	1527			23848	.162	2GEQ 4
	889 TON	24.535	.573	1.718			26.826		
2GEQ 5	BRACING LEVEL 4	48212	14064	3375	253400		319051	2.167	2GEQ 5
	362 TON	133.182	38.851	9.323	700.000		881.356		
2GEQ 6	PRESTRESS LEVEL 4	11106	259	777			12142	.082	2GEQ 6
	362 TON	30.680	.715	2.146			33.541		
2GEQ 7	DRILL & CASE EARTH-L5	15538	5871	15690			37099	.252	2GEQ 7
	7488 LF	2.075	.784	2.095			4.954		
2GEQ 8	DRILL ROCK & INST-L5	32459	17711	32325			82495	.560	2GEQ 8
	6552 LF	4.954	2.703	4.934			12.591		
2GEQ 9	INSTALL WALES-LEVEL 5	21583	6081	13291			40955	.278	2GEQ 9
	44 TON	490.523	138.205	302.068			930.795		
2GEQ 10	REMOVE ANCHOR WALE	2635	947	184			3766	.026	2GEQ 10
	44 TON	59.886	21.523	4.182			85.591		
2GEQ 11	REMOVE INTERN. BRACING	13807	5799	966			20572	.140	2GEQ 11
	398 TON	34.691	14.570	2.427			51.688		
2GEQ 21	END BULKHEAD BRACING	24700	6890	21489	66960		120039	.815	2GEQ 21
	130 TON	190.000	53.000	165.300	515.077		923.377		
2GEQ ITEM	INTERNAL BRACING	348473	98576	299588	942660		1689297	11.472	2GEQ ITEM
	1823 TON	191.154	54.074	164.338	517.093		926.658		

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2HEQ 1	BREAK PAVEMENT & HAUL	14657	6100	1026			21783	.148	2HEQ 1
	6244 SY	2.347	.977	.164			3.489		
2HEQ 2	EXCAVATE FIRST 5 FT	47490	22941	3324			73755	.501	2HEQ 2
	8800 CY	5.397	2.607	.378			8.381		
2HEQ 3	SAND EXCAV 5 TO 22 FT	95400	71694	6678			173772	1.180	2HEQ 3
	30000 CY	3.180	2.390	.223			5.792		
2HEQ 4	SAND EXCAV 22 TO 30 FT	35253	43219	2468			80940	.550	2HEQ 4
	14100 CY	2.500	3.065	.175			5.740		
2HEQ 5	SILT EXCAV 30 TO 50 FT	100840	123628	60009			284477	1.932	2HEQ 5
	35300 CY	2.857	3.502	1.700			8.059		
2HEQ 6	SAND EXCAV 50 TO 60 FT	43991	53932	3079			101002	.686	2HEQ 6
	17600 CY	2.499	3.064	.175			5.739		
2HEQ 7	ROCK EXCAV 60 TO 70 FT	81559	79040	26567			187166	1.271	2HEQ 7
	16600 CY	4.913	4.761	1.600			11.275		
2HEQ 8	FINE GRADE INVERT	26868	12323	8444			47635	.323	2HEQ 8
	5000 SY	5.374	2.465	1.689			9.527		
2HEQ ITEM	EXCAVATION	446058	412877	111595			970530	6.591	2HEQ ITEM
	122400 CY	3.644	3.373	.912			7.929		
2IBR 1	LEVELING SLAB FORMS	8377		3526			11903	.081	2IBR 1
	14 EA	598.357		251.857			850.214		

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2IBR 2	POUR LEVELING SLAB	18929	1933	1325	16232		38419	.261	2IBR 2
	548 CY	34.542	3.527	2.418	29.620		70.108		
2IBR 3	BASE SLAB REBAR	139677	9919	9707	367920		526223	3.574	2IBR 3
	876 TON	158.307	11.323	11.081	420.000		600.711		
2IBR 4	BASE SLAB BULKHEADS	39847		5227			45074	.306	2IBR 4
	6660 SF	5.983		.785			6.768		
2IBR 5	BASE SLAB-POUR,CLEANUP	81205	8293	5684	352538		447720	3.040	2IBR 5
	11682 CY	6.951	.710	.487	30.178		38.326		
2IBR 21	FORM COLUMN PEDESTAL	7180		1617			8797	.060	2IBR 21
	2436 SF	2.947		.664			3.611		
2IBR 22	COL PEDESTAL REBAR	3008	265	211	5040		8524	.058	2IBR 22
	12 TON	250.667	22.083	17.583	420.000		710.333		
2IBR 23	POUR COL PED& CLEANUP	2974	208	208	4776		8166	.055	2IBR 23
	158 CY	18.823	1.316	1.316	30.228		51.684		
2IBR 31	ASSEM TRACK WALL FORMS	10704	973	37349			49026	.333	2IBR 31
	10 DA	1070.400	97.300	3734.900			4902.600		
2IBR 33	WALL & COLUMN REBAR	40749	2915	2852	64680		111196	.755	2IBR 33
	154 TON	264.604	18.929	18.519	420.000		722.052		
2IBR 34	MOVE&SET TRACK WALL FM	57710		9090			66800	.454	2IBR 34
	700 LF	82.443		12.986			95.429		
2IBR 35	POUR TRACK WL CONC&CLN	39194	4003	2744	59567		105508	.716	2IBR 35
	1974 CY	19.855	2.028	1.390	30.176		53.449		

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2IBR 36	ENDWALL CONC-TRACK LVL	19872	920	2863	11224		34879	.237	2IBR 36
	184 CY	108.000	5.000	15.560	61.000		189.560		
2IBR 41	ASSEM MEZZ SLAB FORM	16055	1460	81924			99439	.675	2IBR 41
	15 DA	1070.333	97.333	5461.600			6629.267		
2IBR 42	MOVE & SET MEZZ FORMS	57710		5740			63450	.431	2IBR 42
	700 LF	82.443		8.200			90.643		
2IBR 43	MEZZ SLAB REBAR	44898	3211	3143	86520		137772	.936	2IBR 43
	206 TON	217.951	15.587	15.257	420.000		668.796		
2IBR 44	POUR MEZZ SLAB	39222	4006	2746	82802		128776	.875	2IBR 44
	2744 CY	14.294	1.460	1.001	30.176		46.930		
2IBR 51	MOVE&REASSEMBLE WL FMS	10704	973	5749			17426	.118	2IBR 51
	10 DA	1070.400	97.300	574.900			1742.600		
2IBR 53	WALL & COLUMN REBAR	12706	909	889	20160		34664	.235	2IBR 53
	48 TON	264.708	18.938	18.521	420.000		722.167		
2IBR 54	MOVE&SET MEZZ WALL FMS	57710		8460			66170	.449	2IBR 54
	700 LF	82.443		12.086			94.529		
2IBR 55	POUR MEZZ WL CONC &CLN	39142	3998	2740	19602		65482	.445	2IBR 55
	637 CY	61.447	6.276	4.301	30.772		102.797		
2IBR 56	ENDWALL CONC-MEZZ LEVL	7776	360	1120	4392		13648	.093	2IBR 56
	72 CY	108.000	5.000	15.556	61.000		189.556		
2IBR 61	ASSEM ROOF SLAB FORM	16055	1460	36924			54439	.370	2IBR 61
	15 DA	1070.333	97.333	2461.600			3629.267		

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2IBR 62	MOVE & SET ROOF FORMS	57710		5100			62810	.427	2IBR 62
	700 LF	82.443		7.286			89.729		
2IBR 63	ROOF SLAB REBAR	59273	4239	4149	114240		181901	1.235	2IBR 63
	272 TON	217.915	15.585	15.254	420.000		668.754		
2IBR 64	POUR ROOF SLAB	42550	4346	2979	109230		159105	1.080	2IBR 64
	3619 CY	11.757	1.201	.823	30.182		43.964		
2IBR 65	PLACE ROOF WATERPROOF					60926	60926	.414	2IBR 65
	5944 SY					10.250	10.250		
2IBR 66	MORTAR PROT. FOR W.P.	17995	2583	1890	19889		42357	.288	2IBR 66
	660 CY	27.265	3.914	2.864	30.135		64.177		
2IBR 71	FORM STA PLATFORM	82628		29104			111732	.759	2IBR 71
	33000 SF	2.504		.882			3.386		
2IBR 72	STA.PLATFORM REBAR	26886		1882	50400		79168	.538	2IBR 72
	120 TON	224.050		15.683	420.000		659.733		
2IBR 73	POUR STA PLATFORM	11114	238	778	49517		61647	.419	2IBR 73
	1610 CY	6.903	.148	.483	30.756		38.290		
2IBR 74	FORM STATION STAIRWAYS	11966		3350			15316	.104	2IBR 74
	2400 SF	4.986		1.396			6.382		
2IBR 75	STATION STAIRWAY REBAR	2023		142	1680		3845	.026	2IBR 75
	4 TON	505.750		35.500	420.000		961.250		
2IBR 76	POUR STATION STAIRWAYS	4142	355	290	1465		6252	.042	2IBR 76
	48 CY	86.292	7.396	6.042	30.521		130.250		

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2IBR 78	TRACK INVERT FILL CONC	12620	1795	1513	21536		37464	.254	2IBR 78
	700 CY	18.029	2.564	2.161	30.766		53.520		
2IBR 81	ELECTRICAL-EMBEDDED					125000	125000	.849	2IBR 81
2IBR 82	MECHANICAL-EMBEDDED					75000	75000	.509	2IBR 82
2IBR 83	MISC METALS					37500	37500	.255	2IBR 83
2IBR 91	PATCH&POINT-FORM SURF	42750		2993	2450		48193	.327	2IBR 91
	209600 SF	.204		.014	.012		.230		
2IBR 92	CLEANUP STRUCTURE	8872	497	621			9990	.068	2IBR 92
	15 DA	591.467	33.133	41.400			666.000		
2IBR ITEM	CONSTRUCT PERM STRUCT	1150933	59859	286629	1465860	298426	3261707	22.150	2IBR ITEM
	23976 CY	48.004	2.497	11.955	61.139	12.447	136.040		
2JEQ 1	BACKFILL & TAMP.2 FT.	20510	911	1436	14000		36857	.250	2JEQ 1
	3500 CY	5.860	.260	.410	4.000		10.531		
2JEQ 2	BCKFILL&TMP.2-22 FT.	79641	9893	5575	141200		236309	1.605	2JEQ 2
	35300 CY	2.256	.280	.158	4.000		6.694		
2JEQ 3	BAKFILL&TMP.LAST 5 FT.	59565	7398	4170	35200		106333	.722	2JEQ 3
	8800 CY	6.769	.841	.474	4.000		12.083		
2JEQ ITEM	BACKFILL	159716	18202	11181	190400		379499	2.577	2JEQ ITEM
	47600 CY	3.355	.382	.235	4.000		7.973		

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2K00	1	STREET:6 IN SUBGRADE	4829	1330	338	5850		12347	.084	2K00 1
		4667 SY	1.035	.285	.072	1.253		2.646		
2K00	2	STREET:4 IN BASE AC	4829	1330	338	3750		10247	.070	2K00 2
		4667 SY	1.035	.285	.072	.804		2.196		
2K00	3	STREET PAVING					14817	14817	.101	2K00 3
		4667 SY					3.175	3.175		
2K00	5	BREAK-OUT REM.SIDEWALK	5001	2081	350			7432	.050	2K00 5
		2130 SY	2.348	.977	.164			3.489		
2K00	6	BKFL&TMP S/W VAULTS	23014	2858	1611	14000		41483	.282	2K00 6
		3400 CY	6.769	.841	.474	4.118		12.201		
2K00	7	SIDEWALK:4 IN.SUBGRADE	4869	1340	341	1900		8450	.057	2K00 7
		2825 SY	1.724	.474	.121	.673		2.991		
2K00	8	SIDEWALK:POUR 4IN.CONC	16592		2154	10126		28872	.196	2K00 8
		2825 SY	5.873		.762	3.584		10.220		
2K00	9	ACCESS WALKWAYS	7465	530	2441			10436	.071	2K00 9
		16 DA	466.563	33.125	152.563			652.250		
2K00	ITEM	RESTORATION	66599	9469	7573	35626	14817	134084	.911	2K00 ITEM
2N00	1	FIXED EXPENSE	100800	46000	220056			366856	2.491	2N00 1
2N00	ITEM	OVERHEAD-FIXED COSTS	100800	46000	220056			366856	2.491	2N00 ITEM

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2OJQ	1	OVERHEAD LABOR	1619000		113330			1732330	11.764	2OJQ 1
		41 MO	39487.805		2764.146			42251.951		
2OJQ	2	OVERHEAD EXPENSES			493500			493500	3.351	2OJQ 2
		41 MO			12036.585			12036.585		
2OJQ	3	GENERAL SERVICE CREW	1117402	94972	78218			1290592	8.764	2OJQ 3
		740 DA	1510.003	128.341	105.700			1744.043		
2OJQ	4	VEHICLE OPERATION		48175				48175	.327	2OJQ 4
		41 MO		1175.000				1175.000		
2OJQ	ITEM	OVERHEAD-TIME RELATED	2736402	143147	685048			3564597	24.207	2OJQ ITEM
		41 MO	66741.512	3491.390	16708.488			86941.390		
2P00	1	FIXED PLANT EXPENSES	119720	29000	117480		23800	290000	1.969	2P00 1
2P00	ITEM	PLANT-FIXED COSTS	119720	29000	117480		23800	290000	1.969	2P00 ITEM
2QJQ	1	PLANT-TIME RELATED		14800	249150			263950	1.792	2QJQ 1
		41 MO		360.976	6076.829			6437.805		
2QJQ	ITEM	PLANT-TIME RELATED		14800	249150			263950	1.792	2QJQ ITEM
		41 MO		360.976	6076.829			6437.805		

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 4-2JY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6418224	1255798	3520567	2644679	886299	14725567	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 5-2LY

RAPID TRANSIT STATION
SITE 5 - 70' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

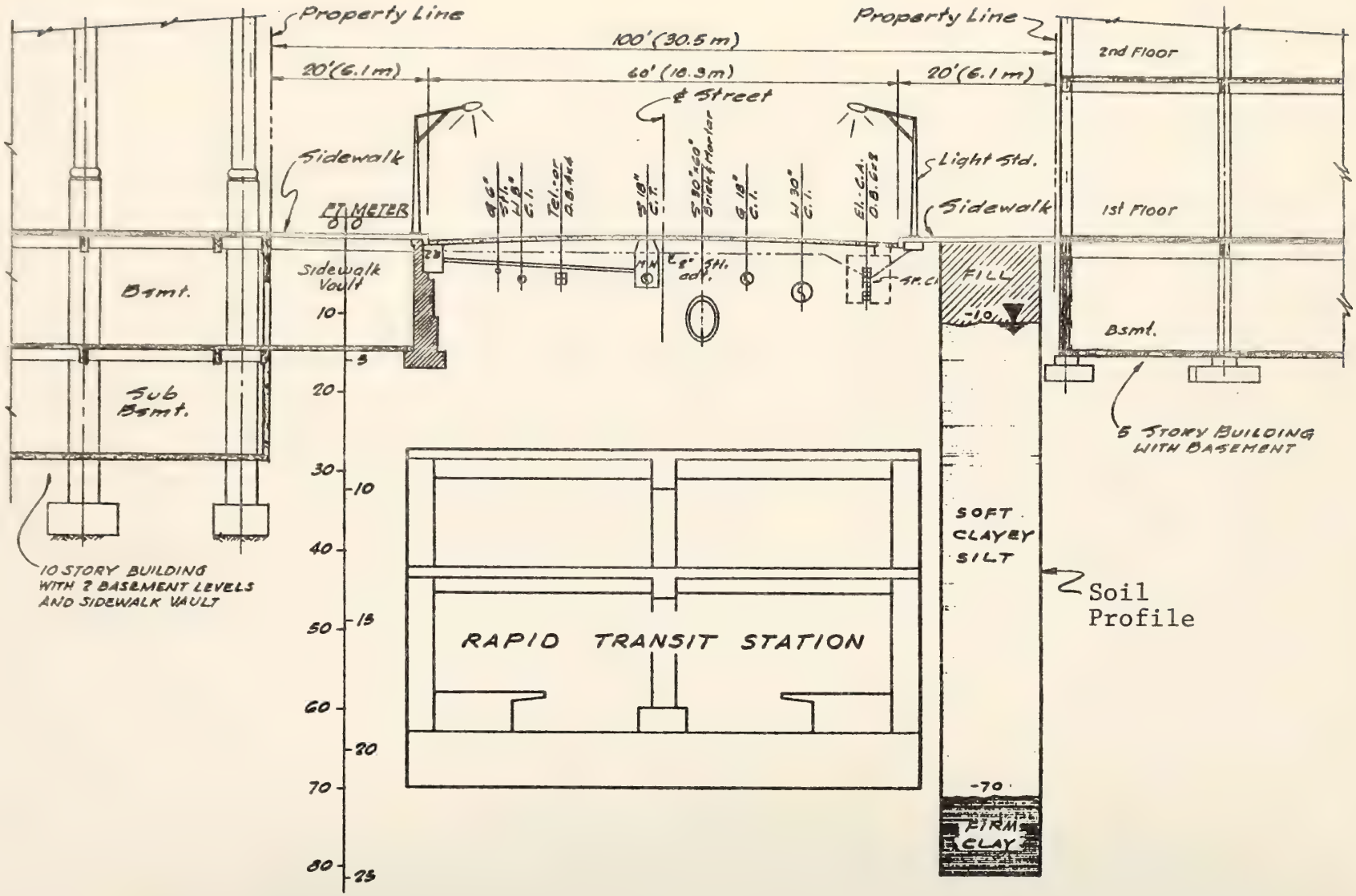


Figure 7. PROJECT 5-2LY - TRANSIT STATION
SITE 5 - 70' DEPTH
PRECAST CONCRETE PANELS - INTERNAL BRACING

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 5-2LY

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6075259	1250667	3192844	3409646	1098271	15026687	100.000
PROJECT						15026687	100.000

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2A00 1	CONST BARRICADES,ETC	18779	518	12245			31542	.210	2A00 1
	20 DA	938.950	25.900	612.250			1577.100		
2A00 2	SET & MOVE BARRIC,ETC	19205	1812	3514			24531	.163	2A00 2
	30 DA	640.167	60.400	117.133			817.700		
2A00 3	FLAGMEN-DIRECT TRAFFIC	43322		3033			46355	.308	2A00 3
	280 DA	154.721		10.832			165.554		
2A00 ITEM	TRAFFIC CONTROL	81306	2330	18792			102428	.682	2A00 ITEM
2BD0 21	UTILITY SUPPORT LONG.	31285	3864	30919			66068	.440	2BD0 21
	700 LF	44.693	5.520	44.170			94.383		
2BD0 22	UTILITY SUPPORT INTER.	10301	530	8107			18938	.126	2BD0 22
	1 EA								
2BD0 23	STORM DR&SEW.TEMP.LONG	15644	1932	13695			31271	.208	2BD0 23
	1400 LF	11.174	1.380	9.782			22.336		
2BD0 24	STORM DR&SEW.PERM.LONG					63000	63000	.419	2BD0 24
	1400 LF					45.000	45.000		
2BD0 26	SEWER PERM. LONGITUD.					17220	17220	.115	2BD0 26
	1400 LF					12.300	12.300		
2BD0 28	SEW. 18IN PERM. INTER.					1845	1845	.012	2BD0 28
	1 EA								
2BD0 30	STM.DR.LATER.PERM.LONG					600	600	.004	2BD0 30
	2 EA					300.000	300.000		

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2BD0 32	STM.DR.LATER.PERM.INT.					600	600	.004	2BD0 32
	2 EA					300.000	300.000		
2BD0 33	BLDG.SEW.LATERALS PERM					1415	1415	.009	2BD0 33
	21 EA					67.381	67.381		
2BD0 35	MANHOLES SEW.PERM.LONG					2300	2300	.015	2BD0 35
	2 EA					1150.000	1150.000		
2BD0 37	MANHOLES SEW.PERM.INT.					1150	1150	.008	2BD0 37
	1 EA								
2BD0 38	CATCH BASINS LONGIT.					1900	1900	.013	2BD0 38
	2 EA					950.000	950.000		
2BD0 39	CATCH BASINS INTER.					1900	1900	.013	2BD0 39
	2 EA					950.000	950.000		
2BD0 40	DIVERT 18IN SEWER INT.					13976	13976	.093	2BD0 40
	1 EA								
2BD0 41	WAT.MAIN 30IN CI LONG.					70000	70000	.466	2BD0 41
	700 LF					100.000	100.000		
2BD0 42	WATER 8IN LONGITUDINAL					24605	24605	.164	2BD0 42
	700 LF					35.150	35.150		
2BD0 43	WATER 8IN INTERSECTION					5954	5954	.040	2BD0 43
	1 EA								
2BD0 44	RELOCATE FIRE HYD.LONG					2500	2500	.017	2BD0 44
	1 EA								

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT SUMM

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2BD0 45	RELOCATE FIRE HYD INT 2 EA					5000 2500.000	5000 2500.000	.033	2BD0 45
2BD0 46	DIVERT 8IN WATER INTER 1 EA					1553	1553	.010	2BD0 46
2BD0 51	GAS MAIN TEMP.LONG. 700 LF					52500 75.000	52500 75.000	.349	2BD0 51
2BD0 52	GAS MAIN.PERM.LONG. 700 LF					31500 45.000	31500 45.000	.210	2BD0 52
2BD0 53	GAS LINE 6IN.INTERSECT 1 EA					2036	2036	.014	2BD0 53
2BD0 54	GAS LINE 6IN TEMP.LONG 700 LF					40005 57.150	40005 57.150	.266	2BD0 54
2BD0 55	GAS LINE 6IN LONGITUD. 700 LF					19005 27.150	19005 27.150	.126	2BD0 55
2BD0 56	DIVERT 6IN GAS INTER. 1 EA					6710	6710	.045	2BD0 56
2BD0 61	TELEPH.4X4 DUCT LONGIT 700 LF					20475 29.250	20475 29.250	.136	2BD0 61
2BD0 62	TELEPH.4X4 DUCT INTER. 1 EA					2194	2194	.015	2BD0 62
2BD0 63	TELEPHONE MANHOLE LONG 1 EA					9990	9990	.066	2BD0 63

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2BD0 64	TELEPHONE MANHOLE INT. 1 EA					9990	9990	.066	2BD0 64
2BD0 65	DIVERT TEL.DUCT INTER. 1 EA					42803	42803	.285	2BD0 65
2BD0 71	ELECT DUCT BK.2X6 LONG 700 LF			11731 16.759			11731 16.759	.078	2BD0 71
2BD0 72	ELECT.DUCT 2X6 INTER. 1 EA			1313			1313	.009	2BD0 72
2BD0 73	ST.LT&TR.SIG.COND.INT. 1 EA					4750	4750	.032	2BD0 73
2BD0 74	STREET LIGHT TEMP.LONG 8 EA	533 66.625		37 4.625			570 71.250	.004	2BD0 74
2BD0 75	STREET LIGHT PERM.LONG 8 EA	533 66.625		37 4.625		1680 210.000	2250 281.250	.015	2BD0 75
2BD0 76	TR.SIG.CONTRL.TEMP INT 1 EA				2000		2000	.013	2BD0 76
2BD0 77	TR.SIG.CONTRL.PERM INT 1 EA					150	150	.001	2BD0 77
2BD0 78	PED.&TRAFFIC SIG.PERM. 1 EA					1200	1200	.008	2BD0 78
2BD0 79	DIVERT ELECT DUCT INT. 1 EA					25750	25750	.171	2BD0 79

TRANSIT STATION-SITE 5-PRE[illegible] -INTERNAL BRACING-70 FOOT DOT 5-2LY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2BD0 80	DIVERT BLDG.LATER[illegible]					63000	63000	.419	2BD0 80
	21 EA					3000.000	3000.000		
2BD0 81	REMOVE UTILITIES SUP[illegible]	6885		482			7367	.049	2BD0 81
	700 LF	9.836		.689			10.524		
2BD0 ITEM	UTILITY WORK	65181	6326	66321	2000	549256	689084	4.586	2BD0 ITEM
2CD0 1	GENL EXTERIOR PROTECT	8063	2608	3396			14067	.094	2CD0 1
	15 DA	537.533	173.867	226.400			937.800		
2CD0 2	SIDEWALK VAULTS &WALLS	32970	6310	7798	8133		55211	.367	2CD0 2
	350 LF	94.200	18.029	22.280	23.237		157.746		
2CD0 ITEM	PROTECT ADJ STRUCTURES	41033	8918	11194	8133		69278	.461	2CD0 ITEM
2DDY 1	TRENCH & SUMP-EXCAV.	99264	20320	20448			140032	.932	2DDY 1
	200 DAY	496.320	101.600	102.240			700.160		
2DDY 2	CONSTR INVERT SUMPS	5419	839	792			7050	.047	2DDY 2
	2 EA	2709.500	419.500	396.000			3525.000		
2DDY 3	PUMPING FROM SUMPS	211748	31750	14822			258320	1.719	2DDY 3
	440 DAY	481.245	72.159	33.686			587.091		
2DDY ITEM	CONTROL GROUNDWATER	316431	52909	36062			405402	2.698	2DDY ITEM
2E00 1	CENTER PILE EXPL HOLE	5303	744	371			6418	.043	2E00 1
	60 EA	88.383	12.400	6.183			106.967		

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2E00 2	DRILL HOLES-CENTR PILE	20036	23728	2523			46287	.308	2E00 2
	60 EA	333.933	395.467	42.050			771.450		
2E00 3	PLACE&SPLICE CEN.PILES	14599	5380	48762			68741	.457	2E00 3
	60 EA	243.317	89.667	812.700			1145.683		
2E00 5	BACKFILL PILE HOLES	5276	1324	5886			12486	.083	2E00 5
	60 EA	87.933	22.067	98.100			208.100		
2E00 6	PILE CAPS,WALES,DECKBM	76234	16701	327836			420771	2.800	2E00 6
	645 TON	118.192	25.893	508.273			652.358		
2E00 7	LATERAL & SWAY BRACING	25722	4617	36801			67140	.447	2E00 7
	50 TON	514.440	92.340	736.020			1342.800		
2E00 8	DECK MATS & TIMBERS	21178	1564	186597			209339	1.393	2E00 8
	5289 SY	4.004	.296	35.280			39.580		
2E00 9	REPOST DECK SUPPORT	28981	8978	6529			44488	.296	2E00 9
	60 EA	483.017	149.633	108.817			741.467		
2E00 11	REMOVE TIMBER DECKING	11814	1825	827			14466	.096	2E00 11
	5289 SY	2.234	.345	.156			2.735		
2E00 12	REMOVE DECK BEAMS	26526	11336	1857			39719	.264	2E00 12
	600 TON	44.210	18.893	3.095			66.198		
2E00 13	REMOVE WALES & CAPS	11109	4748	778			16635	.111	2E00 13
	157 TON	70.758	30.242	4.955			105.955		
2E00 14	REM.LAG.& PILES TO -6	11139	3014	780			14933	.099	2E00 14
	1400 LF	7.956	2.153	.557			10.666		
2E00 ITEM	STREET DECKING	257917	83959	619547			961423	6.398	2E00 ITEM
	5289 SY	48.765	15.874	117.139			181.778		

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2FCY 1	MOB.SLURRY PLT,EQUIP.	17083	30490	1196			48769	.325	2FCY 1
	30 DA	569.433	1016.333	39.867			1625.633		
2FCY 2	PRECAST YARD	99441	46516	6961	1012300	206440	1371658	9.128	2FCY 2
	60 DA	1657.350	775.267	116.017	16871.667	3440.667	22860.967		
2FCY 3	TRENCH @ WALL LOCATION	30927	4340	30615			65882	.438	2FCY 3
	1400 LF	22.091	3.100	21.868			47.059		
2FCY 4	EXCV SLOT FOR PANELS	107902	137821	7553			253276	1.686	2FCY 4
	17630 CY	6.120	7.817	.428			14.366		
2FCY 5	SET PRE-CAST PANELS	75974	38601	22643			137218	.913	2FCY 5
	234 EA	324.675	164.962	96.765			586.402		
2FCY 6	OPERATE SLURRY EQUIP.	217327	49083	171928			438338	2.917	2FCY 6
	166 DA	1309.199	295.681	1035.711			2640.590		
2FCY 7	DEMOBE.SLURRY EQUIP.	9927	2816	695			13438	.089	2FCY 7
	10 DA	992.700	281.600	69.500			1343.800		
2FCY 8	PLACE LAGGING 1ST.10FT	20219	1855	10655			32729	.218	2FCY 8
	14000 SF	1.444	.133	.761			2.338		
2FCY 9	CLN.PNL.& PATCH JT.	102169	22921	16098			141188	.940	2FCY 9
	260 DA	392.958	88.158	61.915			543.031		
2FCY 21	STATION END BULKHEADS	60660	30330	27499	99078	20220	237787	1.582	2FCY 21
	1011 SY	60.000	30.000	27.200	98.000	20.000	235.200		
2FCY ITEM	GROUND SUPPORT WALL	741629	364773	295843	1111378	226660	2740283	18.236	2FCY ITEM
	11900 SY	62.322	30.653	24.861	93.393	19.047	230.276		

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2GEQ 1	BRACING LEVEL 2	46655	13609	222266			282530	1.880	2GEQ 1
	438 TON	106.518	31.071	507.457			645.046		
2GEQ 2	PRESTRESS LEVEL 2	21493	501	1505			23499	.156	2GEQ 2
	438 TON	49.071	1.144	3.436			53.651		
2GEQ 3	BRACING LEVEL 3	87240	25448	6107	573300		692095	4.606	2GEQ 3
	819 TON	106.520	31.072	7.457	700.000		845.049		
2GEQ 4	PRESTRESS LEVEL 3	20095	468	1407			21970	.146	2GEQ 4
	819 TON	24.536	.571	1.718			26.825		
2GEQ 5	BRACING LEVEL 4	44738	13050	3132	235200		296120	1.971	2GEQ 5
	336 TON	133.149	38.839	9.321	700.000		881.310		
2GEQ 6	PRESTRESS LEVEL 4	10306	240	721			11267	.075	2GEQ 6
	336 TON	30.673	.714	2.146			33.533		
2GEQ 7	BRACING LEVEL 5	44311	12926	211102			268339	1.786	2GEQ 7
	416 TON	106.517	31.072	507.457			645.046		
2GEQ 8	PRESTRESS LEVEL 5	10207	238	714			11159	.074	2GEQ 8
	416 TON	24.536	.572	1.716			26.825		
2GEQ 9	REMOVE BRAC.LEVEL 5	22157	6463	1551			30171	.201	2GEQ 9
	416 TON	53.262	15.536	3.728			72.526		
2GEQ 12	REMOVE BRAC.LEVEL 2	23328	6805	1633			31766	.211	2GEQ 12
	438 TON	53.260	15.537	3.728			72.525		
2GEQ 21	END BULKHEAD BRACING	29410	7310	43179	64260		144159	.959	2GEQ 21
	170 TON	173.000	43.000	253.994	378.000		847.994		
2GEQ ITEM	INTERNAL BRACING	359940	87058	493317	872760		1813075	12.066	2GEQ ITEM
	2179 TON	165.186	39.953	226.396	400.532		832.067		

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2HEQ 1	BREAK PAVEMENT & HAUL	10566	4397	740			15703	.105	2HEQ 1
	4500 SY	2.348	.977	.164			3.490		
2HEQ 2	EXCAVATE 1ST. 5 FT.	40477	19555	14083			74115	.493	2HEQ 2
	7500 CY	5.397	2.607	1.878			9.882		
2HEQ 3	EXCAVATE 5 TO 22 FT	83625	59208	44254			187087	1.245	2HEQ 3
	25600 CY	3.267	2.313	1.729			7.308		
2HEQ 4	EXCAVATE 22 TO 30 FT	37771	36824	20644			95239	.634	2HEQ 4
	12000 CY	3.148	3.069	1.720			7.937		
2HEQ 5	EXCAVATE 30 TO 50 FT	85984	105411	51169			242564	1.614	2HEQ 5
	30100 CY	2.857	3.502	1.700			8.059		
2HEQ 6	EXCAVATE 50 TO 70 FT	92601	113527	51632			257760	1.715	2HEQ 6
	30100 CY	3.076	3.772	1.715			8.563		
2HEQ 7	FINE GRADE INVERT	27408	12571	10169			50148	.334	2HEQ 7
	5100 SY	5.374	2.465	1.994			9.833		
2HEQ ITEM	EXCAVATION	378432	351493	192691			922616	6.140	2HEQ ITEM
	105300 CY	3.594	3.338	1.830			8.762		
2ICR 1	LEVELING SLAB FORMS	8377		3526			11903	.079	2ICR 1
	14 EA	598.357		251.857			850.214		
2ICR 2	POUR LEVELING SLAB	18944	1934	1326	14681		36885	.245	2ICR 2
	496 CY	38.194	3.899	2.673	29.599		74.365		

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2ICR 3	BASE SLAB REBAR	129343	9251	9054	343140		490788	3.266	2ICR 3
	817 TON	158.315	11.323	11.082	420.000		600.720		
2ICR 4	BASE SLAB BULKHEADS	35899		4834			40733	.271	2ICR 4
	5880 SF	6.105		.822			6.927		
2ICR 5	BASE SLAB-POUR,CLEANUP	75714	7732	5300	328746		417492	2.778	2ICR 5
	10892 CY	6.951	.710	.487	30.182		38.330		
2ICR 21	FORM COLUMN PEDESTAL	7180		1617			8797	.059	2ICR 21
	2436 SF	2.947		.664			3.611		
2ICR 22	COL PEDESTAL REBAR	3008	265	211	5040		8524	.057	2ICR 22
	12 TON	250.667	22.083	17.583	420.000		710.333		
2ICR 23	POUR COL PED& CLEANUP	2974	208	208	4776		8166	.054	2ICR 23
	158 CY	18.823	1.316	1.316	30.228		51.684		
2ICR 33	LOWER COLUMN REBAR	3008	265	211	4620		8104	.054	2ICR 33
	11 TON	273.455	24.091	19.182	420.000		736.727		
2ICR 34	FORM LOWER COLUMNS	15096		3060			18156	.121	2ICR 34
	5046 SF	2.992		.606			3.598		
2ICR 35	POUR LOWER COLUMNS	2974	208	208	4249		7639	.051	2ICR 35
	140 CY	21.243	1.486	1.486	30.350		54.564		
2ICR 41	ASSEM MEZZ SLAB FORM	16055	1460	81924			99439	.662	2ICR 41
	15 DA	1070.333	97.333	5461.600			6629.267		
2ICR 42	MOVE & SET MEZZ FORMS	57710		5740			63450	.422	2ICR 42
	700 LF	82.443		8.200			90.643		

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2ICR 43	MEZZ SLAB REBAR	40749	2915	2852	78540		125056	.832	2ICR 43
	187 TON	217.909	15.588	15.251	420.000		668.749		
2ICR 44	POUR MEZZ SLAB	37856	3867	2650	75213		119586	.796	2ICR 44
	2492 CY	15.191	1.552	1.063	30.182		47.988		
2ICR 53	UPPER COLUMN REBAR	1505	132	105	2520		4262	.028	2ICR 53
	6 TON	250.833	22.000	17.500	420.000		710.333		
2ICR 54	FORM UPPER COLUMNS	7808		1694			9502	.063	2ICR 54
	2610 SF	2.992		.649			3.641		
2ICR 55	POUR UPPER COLUMNS	2974	208	208	2198		5588	.037	2ICR 55
	72 CY	41.306	2.889	2.889	30.528		77.611		
2ICR 61	ASSEM ROOF SLAB FORM	16055	1460	36924			54439	.362	2ICR 61
	15 DA	1070.333	97.333	2461.600			3629.267		
2ICR 62	MOVE & SET ROOF FORMS	57710		5100			62810	.418	2ICR 62
	700 LF	82.443		7.286			89.729		
2ICR 63	ROOF SLAB REBAR	55121	3943	3858	106260		169182	1.126	2ICR 63
	253 TON	217.870	15.585	15.249	420.000		668.704		
2ICR 64	POUR ROOF SLAB	37940	3875	2656	101671		146142	.973	2ICR 64
	3367 CY	11.268	1.151	.789	30.196		43.404		
2ICR 65	PLACE ROOF WATERPROOF					46238	46238	.308	2ICR 65
	4511 SY					10.250	10.250		
2ICR 66	MORTOR PROT. FOR W.P.	18368	2638	1916	19373		42295	.281	2ICR 66
	500 CY	36.736	5.276	3.832	38.746		84.590		

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2ICR 71	FORM STA PLATFORM	82628		29104			111732	.744	2ICR 71
	33000 SF	2.504		.882			3.386		
2ICR 72	STA.PLATFORM REBAR	26886		1882	50400		79168	.527	2ICR 72
	120 TON	224.050		15.683	420.000		659.733		
2ICR 73	POUR STA PLATFORM	11114	238	778	49517		61647	.410	2ICR 73
	1610 CY	6.903	.148	.483	30.756		38.290		
2ICR 74	FORM STATION STAIRWAYS	11966		3350			15316	.102	2ICR 74
	2400 SF	4.986		1.396			6.382		
2ICR 75	STATION STAIRWAY REBAR	2023		142	1680		3845	.026	2ICR 75
	4 TON	505.750		35.500	420.000		961.250		
2ICR 76	POUR STATION STAIRWAYS	4142	355	290	1465		6252	.042	2ICR 76
	48 CY	86.292	7.396	6.042	30.521		130.250		
2ICR 78	TRACK INVERT FILL CONC	12620	1795	1513	21536		37464	.249	2ICR 78
	700 CY	18.029	2.564	2.161	30.766		53.520		
2ICR 81	ELECTRICAL-EMBEDDED					125000	125000	.832	2ICR 81
2ICR 82	MECHANICAL-EMBEDDED					75000	75000	.499	2ICR 82
2ICR 83	MISC METALS					37500	37500	.250	2ICR 83
2ICR 91	PATCH&POINT-FORM SURF	30187		2113	1724		34024	.226	2ICR 91
	148000 SF	.204		.014	.012		.230		
2ICR 92	CLEANUP STRUCTURE	8872	497	621			9990	.066	2ICR 92
	15 DA	591.467	33.133	41.400			666.000		
2ICR ITEM	CONSTRUCT PERM STRUCT	842806	43246	214975	1217349	283738	2602114	17.317	2ICR ITEM
	19975 CY	42.193	2.165	10.762	60.944	14.205	130.269		

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2JEQ 1	BACKFILL & TAMP.2 FT.	17580	782	1231	12000		31593	.210	2JEQ 1
	3000 CY	5.860	.261	.410	4.000		10.531		
2JEQ 2	BCKFILL&TMP.2-22 FT.	67919	8435	4754	120400		201508	1.341	2JEQ 2
	30100 CY	2.256	.280	.158	4.000		6.695		
2JEQ 3	BAKFILL&TMP.LAST 5 FT.	50766	6306	3554	30000		90626	.603	2JEQ 3
	7500 CY	6.769	.841	.474	4.000		12.083		
2JEQ ITEM	BACKFILL	136265	15523	9539	162400		323727	2.154	2JEQ ITEM
	40600 CY	3.356	.382	.235	4.000		7.974		
2K00 1	STREET:6 IN SUBGRADE	4829	1330	338	5850		12347	.082	2K00 1
	4667 SY	1.035	.285	.072	1.253		2.646		
2K00 2	STREET:4 IN BASE AC	4829	1330	338	3750		10247	.068	2K00 2
	4667 SY	1.035	.285	.072	.804		2.196		
2K00 3	STREET PAVING					14817	14817	.099	2K00 3
	4667 SY					3.175	3.175		
2K00 5	BREAK-OUT REM.SIDEWALK	5001	2081	350			7432	.049	2K00 5
	2130 SY	2.348	.977	.164			3.489		
2K00 6	BKFL&TMP S/W VAULTS	23014	2858	1611	14000		41483	.276	2K00 6
	3400 CY	6.769	.841	.474	4.118		12.201		
2K00 7	SIDEWALK:4 IN.SUBGRADE	4869	1340	341	1900		8450	.056	2K00 7
	2825 SY	1.724	.474	.121	.673		2.991		

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2K00 8	SIDEWALK:POUR 4IN.CONC	16592		2154	10126		28872	.192	2K00 8
	2825 SY	5.873		.762	3.584		10.220		
2K00 9	ACCESS WALKWAYS	7465	530	2441			10436	.069	2K00 9
	16 DA	466.563	33.125	152.563			652.250		
2K00 ITEM	RESTORATION	66599	9469	7573	35626	14817	134084	.892	2K00 ITEM
2N00 1	FIXED EXPENSE	100800	46000	224056			370856	2.468	2N00 1
2N00 ITEM	OVERHEAD-FIXED COSTS	100800	46000	224056			370856	2.468	2N00 ITEM
2OLQ 1	OVERHEAD LABOR	1510200		105714			1615914	10.754	2OLQ 1
	39 MO	38723.077		2710.615			41433.692		
2OLQ 2	OVERHEAD EXPENSES			469500			469500	3.124	2OLQ 2
	39 MO			12038.462			12038.462		
2OLQ 3	GENERAL SERVICE CREW	1057000	89838	73990			1220828	8.124	2OLQ 3
	700 DA	1510.000	128.340	105.700			1744.040		
2OLQ 4	VEHICLE OPERATION		45825				45825	.305	2OLQ 4
	39 MO		1175.000				1175.000		
2OLQ ITEM	OVERHEAD-TIME RELATED	2567200	135663	649204			3352067	22.307	2OLQ ITEM
	39 MO	65825.641	3478.538	16646.256			85950.436		
2P00 1	FIXED PLANT EXPENSES	119720	29000	117480		23800	290000	1.930	2P00 1
2P00 ITEM	PLANT-FIXED COSTS	119720	29000	117480		23800	290000	1.930	2P00 ITEM

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2QLQ 1 PLANT-TIME RELATED		14000	236250			250250	1.665	2QLQ 1
39 MO		358.974	6057.692			6416.667		
2QLQ ITEM PLANT-TIME RELATED		14000	236250			250250	1.665	2QLQ ITEM
39 MO		358.974	6057.692			6416.667		

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6075259	1250667	3192844	3409646	1098271	15026687	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 3-2MY

RAPID TRANSIT STATION
SITE 3 - 70' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
TIEBACK BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

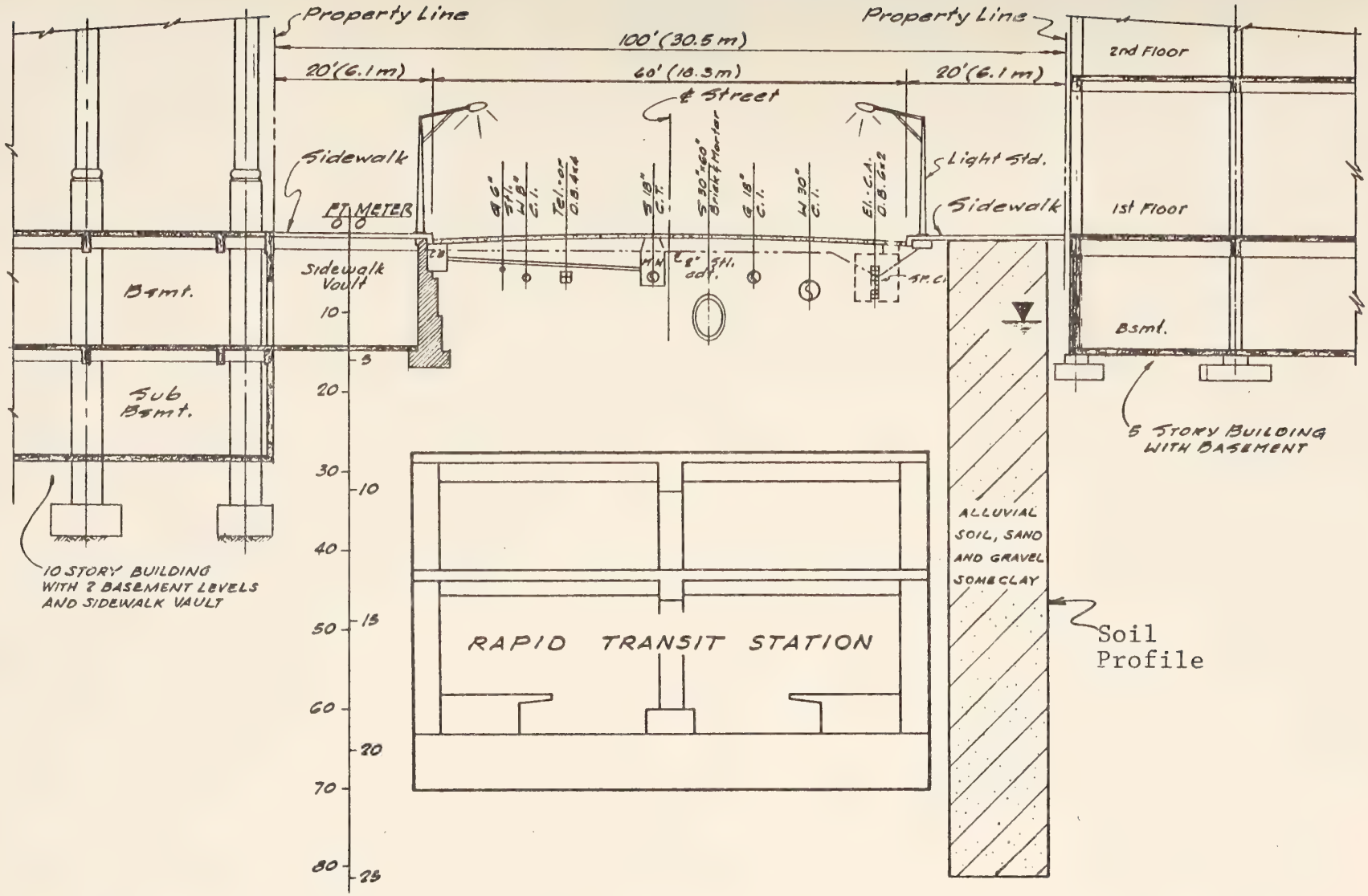


Figure 8. PROJECT 3-2MY - TRANSIT STATION
SITE 3 - 70' DEPTH
PRECAST CONCRETE PANELS - TIEBACK BRACING

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	5801725	1293818	3114461	3225644	2125692	15561340	100.000
PROJECT						15561340	100.000

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2A00	1	CONST BARRICADES,ETC	18779	518	12245			31542	.203	2A00 1
		20 DA	938.950	25.900	612.250			1577.100		
2A00	2	SET & MOVE BARRIC,ETC	19205	1812	3514			24531	.158	2A00 2
		30 DA	640.167	60.400	117.133			817.700		
2A00	3	FLAGMEN-DIRECT TRAFFIC	38680		2708			41388	.266	2A00 3
		250 DA	154.720		10.832			165.552		
2A00	ITEM	TRAFFIC CONTROL	76664	2330	18467			97461	.626	2A00 ITEM
2BD1	1	ALL OPERATIONS	65181	6326	66321	2000	549256	689084	4.428	2BD1 1
2BD1	ITEM	UTILITY WORK-ALTERNATE	65181	6326	66321	2000	549256	689084	4.428	2BD1 ITEM
2CD0	1	GENL EXTERIOR PROTECT	8063	2608	3396			14067	.090	2CD0 1
		15 DA	537.533	173.867	226.400			937.800		
2CD0	2	SIDEWALK VAULTS &WALLS	32970	6310	7798	8133		55211	.355	2CD0 2
		350 LF	94.200	18.029	22.280	23.237		157.746		
2CD0	ITEM	PROTECT ADJ STRUCTURES	41033	8918	11194	8133		69278	.445	2CD0 ITEM
2DDY	1	F.I.&R. PUMP SYSTEM					246377	246377	1.583	2DDY 1
2DDY	2	F.I.&R. RECHARGE SYST					237465	237465	1.526	2DDY 2
2DDY	3	MAINT SYST-FIRST 6 MOS					180457	180457	1.160	2DDY 3
		6 MO					30076.167	30076.167		

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2DDY 4	MAINT SYST-AFTER 6 MOS					372816	372816	2.396	2DDY 4
	12 MO					31068.000	31068.000		
2DDY ITEM	CONTROL GROUNDWATER					1037115	1037115	6.665	2DDY ITEM
2E00 1	CENTER PILE EXPL HOLE	5303	744	371			6418	.041	2E00 1
	60 EA	88.383	12.400	6.183			106.967		
2E00 2	DRILL HOLES-CENTR PILE	20036	23728	2523			46287	.297	2E00 2
	60 EA	333.933	395.467	42.050			771.450		
2E00 3	PLACE&SPLICE CEN.PILES	14599	5380	48762			68741	.442	2E00 3
	60 EA	243.317	89.667	812.700			1145.683		
2E00 5	BACKFILL PILE HOLES	5276	1324	5886			12486	.080	2E00 5
	60 EA	87.933	22.067	98.100			208.100		
2E00 6	PILE CAPS,WALES,DECKBM	76234	16701	327836			420771	2.704	2E00 6
	645 TON	118.192	25.893	508.273			652.358		
2E00 7	LATERAL & SWAY BRACING	25722	4617	36801			67140	.431	2E00 7
	50 TON	514.440	92.340	736.020			1342.800		
2E00 8	DECK MATS & TIMBERS	21178	1564	186597			209339	1.345	2E00 8
	5289 SY	4.004	.296	35.280			39.580		
2E00 9	REPOST DECK SUPPORT	28981	8978	6529			44488	.286	2E00 9
	60 EA	483.017	149.633	108.817			741.467		
2E00 11	REMOVE TIMBER DECKING	11814	1825	827			14466	.093	2E00 11
	5289 SY	2.234	.345	.156			2.735		

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2E00 12	REMOVE DECK BEAMS	26526	11336	1857			39719	.255	2E00 12
	600 TON	44.210	18.893	3.095			66.198		
2E00 13	REMOVE WALES & CAPS	11109	4748	778			16635	.107	2E00 13
	157 TON	70.758	30.242	4.955			105.955		
2E00 14	REM.LAG.& PILES TO -6	11139	3014	780			14933	.096	2E00 14
	1400 LF	7.956	2.153	.557			10.666		
2E00 ITEM	STREET DECKING	257917	83959	619547			961423	6.178	2E00 ITEM
	5289 SY	48.765	15.874	117.139			181.778		
2FCY 1	MOB.SLURRY PLT,EQUIP.	17083	30490	1196			48769	.313	2FCY 1
	30 DA	569.433	1016.333	39.867			1625.633		
2FCY 2	PRECAST YARD	99441	46516	6961	914800	190680	1258398	8.087	2FCY 2
	60 DA	1657.350	775.267	116.017	15246.667	3178.000	20973.300		
2FCY 3	TRENCH @ WALL LOCATION	30927	4340	30615			65882	.423	2FCY 3
	1400 LF	22.091	3.100	21.868			47.059		
2FCY 4	EXCV SLOT FOR PANELS	90313	115355	6322			211990	1.362	2FCY 4
	15867 CY	5.692	7.270	.398			13.360		
2FCY 5	SET PRE-CAST PANELS	75974	38601	22643			137218	.882	2FCY 5
	234 EA	324.675	164.962	96.765			586.402		
2FCY 6	OPERATE SLURRY EQUIP.	217327	49083	154898			421308	2.707	2FCY 6
	166 DA	1309.199	295.681	933.120			2538.000		

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2FCY 7	DEMOBE.SLURRY EQUIP.	9927	2816	695			13438	.086	2FCY 7
	10 DA	992.700	281.600	69.500			1343.800		
2FCY 8	PLACE LAGGING 1ST.10FT	20219	1855	10655			32729	.210	2FCY 8
	14000 SF	1.444	.133	.761			2.338		
2FCY 9	CLN.PNL.& PATCH JT.	78592	17632	14447			110671	.711	2FCY 9
	200 DA	392.960	88.160	72.235			553.355		
2FCY 21	STATION END BULKHEADS	59649	28308	23384	76836	26286	214463	1.378	2FCY 21
	1011 SY	59.000	28.000	23.130	76.000	26.000	212.130		
2FCY ITEM	GROUND SUPPORT WALL	699452	334996	271816	991636	216966	2514866	16.161	2FCY ITEM
	11900 SY	58.777	28.151	22.842	83.331	18.232	211.333		
2GFY 1	MOBILIZE & DEMOBILIZE	4098	2878	287			7263	.047	2GFY 1
	10 DA	409.800	287.800	28.700			726.300		
2GFY 2	INST. TIEBACK-LEVEL 2	152252	79249	121416			352917	2.268	2GFY 2
	38150 LF	3.991	2.077	3.183			9.251		
2GFY 3	INSTALL WALE-LEVEL 2	31903	8988	22633			63524	.408	2GFY 3
	80 TON	398.788	112.350	282.913			794.050		
2GFY 4	INST. TIEBACK-LEVEL 3	61462	31992	94502			187956	1.208	2GFY 4
	30800 LF	1.996	1.039	3.068			6.102		
2GFY 5	INSTALL WALE-LEVEL 3	31903	8988	22633			63524	.408	2GFY 5
	80 TON	398.788	112.350	282.913			794.050		

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2GFY 6	INST. TIEBACK-LEVEL 4	53082	27630	82161			162873	1.047	2GFY 6
	26600 LF	1.996	1.039	3.089			6.123		
2GFY 7	INSTALL WALE-LEVEL 4	31815	8964	32827			73606	.473	2GFY 7
	120 TON	265.125	74.700	273.558			613.383		
2GFY 8	INST. TIEBACK-LEVEL 5	48189	25084	74896			148169	.952	2GFY 8
	24150 LF	1.995	1.039	3.101			6.135		
2GFY 9	INSTALL WALE-LEVEL 5	31943	8999	24216			65158	.419	2GFY 9
	84 TON	380.274	107.131	288.286			775.690		
2GFY 10	INST. TIEBACK-LEVEL 6	44001	22902	68726			135629	.872	2GFY 10
	22050 LF	1.996	1.039	3.117			6.151		
2GFY 11	INSTALL WALE-LEVEL 6	31943	8999	24216			65158	.419	2GFY 11
	84 TON	380.274	107.131	288.286			775.690		
2GFY 12	INST. TIEBACK-LEVEL 7	35620	18540	56384			110544	.710	2GFY 12
	17850 LF	1.996	1.039	3.159			6.193		
2GFY 13	INSTALL WALE-LEVEL 7	31865	8978	25311			66154	.425	2GFY 13
	89 TON	358.034	100.876	284.393			743.303		
2GFY 14	REMOVE WALE STEEL	32172	11560	2252			45984	.296	2GFY 14
	537 TON	59.911	21.527	4.194			85.631		
2GFY 21	END BULKHEADS	58400	25112	58108			141620	.910	2GFY 21
	14600 LF	4.000	1.720	3.980			9.700		
2GFY ITEM	BRACING - TIEBACK	680648	298863	710568			1690079	10.861	2GFY ITEM
	174200 LF	3.907	1.716	4.079			9.702		

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2HFQ 1	BREAK PAVEMENT & HAUL	10566	4397	740			15703	.101	2HFQ 1
	4500 SY	2.348	.977	.164			3.490		
2HFQ 2	EXCAVATE FIRST 5 FT	40477	19555	2833			62865	.404	2HFQ 2
	7500 CY	5.397	2.607	.378			8.382		
2HFQ 3	EXCAVATE 5 TO 22 FT	65126	48943	4559			118628	.762	2HFQ 3
	25600 CY	2.544	1.912	.178			4.634		
2HFQ 4	EXCAVATE 22 TO 70 FT	128056	162696	8964			299716	1.926	2HFQ 4
	72200 CY	1.774	2.253	.124			4.151		
2HFQ 5	FINE GRADE INVERT	19344	8872	1354			29570	.190	2HFQ 5
	4500 SY	4.299	1.972	.301			6.571		
2HFQ ITEM	EXCAVATION	263569	244463	18450			526482	3.383	2HFQ ITEM
	105300 CY	2.503	2.322	.175			5.000		
2ICR 1	LEVELING SLAB FORMS	8377		3526			11903	.076	2ICR 1
	14 EA	598.357		251.857			850.214		
2ICR 2	POUR LEVELING SLAB	18944	1934	1326	14681		36885	.237	2ICR 2
	496 CY	38.194	3.899	2.673	29.599		74.365		
2ICR 3	BASE SLAB REBAR	129343	9251	9054	343140		490788	3.154	2ICR 3
	817 TON	158.315	11.323	11.082	420.000		600.720		
2ICR 4	BASE SLAB BULKHEADS	35899		4834			40733	.262	2ICR 4
	5880 SF	6.105		.822			6.927		

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2ICR 5	BASE SLAB-POUR,CLEANUP	75714	7732	5300	328746		417492	2.683	2ICR 5
	10892 CY	6.951	.710	.487	30.182		38.330		
2ICR 11	MEZZ STRUCTURAL STEEL	22370	6525	1566	235200		265661	1.707	2ICR 11
	336 TON	66.577	19.420	4.661	700.000		790.658		
2ICR 12	PRESTRESS MEZZ STEEL	10306	240	721			11267	.072	2ICR 12
	336 TON	30.673	.714	2.146			33.533		
2ICR 13	ROOF STRUCTURAL STEEL	87240	25448	6107	573300		692095	4.448	2ICR 13
	819 TON	106.520	31.072	7.457	700.000		845.049		
2ICR 14	PRESTRESS ROOF STEEL	20095	468	1407			21970	.141	2ICR 14
	819 TON	24.536	.571	1.718			26.825		
2ICR 21	FORM COLUMN PEDESTAL	7180		1617			8797	.057	2ICR 21
	2436 SF	2.947		.664			3.611		
2ICR 22	COL PEDESTAL REBAR	3008	265	211	5040		8524	.055	2ICR 22
	12 TON	250.667	22.083	17.583	420.000		710.333		
2ICR 23	POUR COL PED& CLEANUP	2974	208	208	4776		8166	.052	2ICR 23
	158 CY	18.823	1.316	1.316	30.228		51.684		
2ICR 33	LOWER COLUMN REBAR	3008	265	211	4620		8104	.052	2ICR 33
	11 TON	273.455	24.091	19.182	420.000		736.727		
2ICR 34	FORM LOWER COLUMNS	15096		3060			18156	.117	2ICR 34
	5046 SF	2.992		.606			3.598		
2ICR 35	POUR LOWER COLUMNS	2974	208	208	4249		7639	.049	2ICR 35
	140 CY	21.243	1.486	1.486	30.350		54.564		

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2ICR 41	ASSEM MEZZ SLAB FORM	16055	1460	81924			99439	.639	2ICR 41
	15 DA	1070.333	97.333	5461.600			6629.267		
2ICR 42	MOVE & SET MEZZ FORMS	57710		5740			63450	.408	2ICR 42
	700 LF	82.443		8.200			90.643		
2ICR 43	MEZZ SLAB REBAR	40749	2915	2852	78540		125056	.804	2ICR 43
	187 TON	217.909	15.588	15.251	420.000		668.749		
2ICR 44	POUR MEZZ SLAB	37856	3867	2650	75213		119586	.768	2ICR 44
	2492 CY	15.191	1.552	1.063	30.182		47.988		
2ICR 53	UPPER COLUMN REBAR	1505	132	105	2520		4262	.027	2ICR 53
	6 TON	250.833	22.000	17.500	420.000		710.333		
2ICR 54	FORM UPPER COLUMNS	7808		1694			9502	.061	2ICR 54
	2610 SF	2.992		.649			3.641		
2ICR 55	POUR UPPER COLUMNS	2974	208	208	2198		5588	.036	2ICR 55
	72 CY	41.306	2.889	2.889	30.528		77.611		
2ICR 61	ASSEM ROOF SLAB FORM	16055	1460	36924			54439	.350	2ICR 61
	15 DA	1070.333	97.333	2461.600			3629.267		
2ICR 62	MOVE & SET ROOF FORMS	57710		5100			62810	.404	2ICR 62
	700 LF	82.443		7.286			89.729		
2ICR 63	ROOF SLAB REBAR	55121	3943	3858	106260		169182	1.087	2ICR 63
	253 TON	217.870	15.585	15.249	420.000		668.704		
2ICR 64	POUR ROOF SLAB	37940	3875	2656	101671		146142	.939	2ICR 64
	3367 CY	11.268	1.151	.789	30.196		43.404		

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2ICR 65	PLACE ROOF WATERPROOF					46238	46238	.297	2ICR 65
	4511 SY					10.250	10.250		
2ICR 66	MORTOR PROT. FOR W.P.	18368	2638	1916	19373		42295	.272	2ICR 66
	500 CY	36.736	5.276	3.832	38.746		84.590		
2ICR 71	FORM STA PLATFORM	82628		29104			111732	.718	2ICR 71
	33000 SF	2.504		.882			3.386		
2ICR 72	STA.PLATFORM REBAR	26886		1882	50400		79168	.509	2ICR 72
	120 TON	224.050		15.683	420.000		659.733		
2ICR 73	POUR STA PLATFORM	11114	238	778	49517		61647	.396	2ICR 73
	1610 CY	6.903	.148	.483	30.756		38.290		
2ICR 74	FORM STATION STAIRWAYS	11966		3350			15316	.098	2ICR 74
	2400 SF	4.986		1.396			6.382		
2ICR 75	STATION STAIRWAY REBAR	2023		142	1680		3845	.025	2ICR 75
	4 TON	505.750		35.500	420.000		961.250		
2ICR 76	POUR STATION STAIRWAYS	4142	355	290	1465		6252	.040	2ICR 76
	48 CY	86.292	7.396	6.042	30.521		130.250		
2ICR 78	TRACK INVERT FILL CONC	12620	1795	1513	21536		37464	.241	2ICR 78
	700 CY	18.029	2.564	2.161	30.766		53.520		
2ICR 81	ELECTRICAL-EMBEDDED					125000	125000	.803	2ICR 81
2ICR 82	MECHANICAL-EMBEDDED					75000	75000	.482	2ICR 82

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2ICR 83	MISC METALS					37500	37500	.241	2ICR 83
2ICR 91	PATCH&POINT-FORM SURF	30187		2113	1724		34024	.219	2ICR 91
	148000 SF	.204		.014	.012		.230		
2ICR 92	CLEANUP STRUCTURE	8872	497	621			9990	.064	2ICR 92
	15 DA	591.467	33.133	41.400			666.000		
2ICR ITEM	CONSTRUCT PERM STRUCT	982817	75927	224776	2025849	283738	3593107	23.090	2ICR ITEM
	19975 CY	49.202	3.801	11.253	101.419	14.205	179.880		
2JFQ 1	BACKFILL & TAMP 2 FT	17580	782	1231	12000		31593	.203	2JFQ 1
	3000 CY	5.860	.261	.410	4.000		10.531		
2JFQ 2	BACKFILL & TMP 2-22 FT	26777	9241	1874	120400		158292	1.017	2JFQ 2
	30100 CY	.890	.307	.062	4.000		5.259		
2JFQ 3	BACKFILL & TMP.TOP 5FT	50766	6306	3554	30000		90626	.582	2JFQ 3
	7500 CY	6.769	.841	.474	4.000		12.083		
2JFQ ITEM	BACKFILL	95123	16329	6659	162400		280511	1.803	2JFQ ITEM
	40600 CY	2.343	.402	.164	4.000		6.909		
2K00 1	STREET:6 IN SUBGRADE	4829	1330	338	5850		12347	.079	2K00 1
	4667 SY	1.035	.285	.072	1.253		2.646		
2K00 2	STREET:4 IN BASE AC	4829	1330	338	3750		10247	.066	2K00 2
	4667 SY	1.035	.285	.072	.804		2.196		

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2K00	3	STREET PAVING					14817	14817	.095	2K00 3
		4667 SY					3.175	3.175		
2K00	5	BREAK-OUT REM.SIDEWALK	5001	2081	350			7432	.048	2K00 5
		2130 SY	2.348	.977	.164			3.489		
2K00	6	BKFL&TMP S/W VAULTS	23014	2858	1611	14000		41483	.267	2K00 6
		3400 CY	6.769	.841	.474	4.118		12.201		
2K00	7	SIDEWALK:4 IN.SUBGRADE	4869	1340	341	1900		8450	.054	2K00 7
		2825 SY	1.724	.474	.121	.673		2.991		
2K00	8	SIDEWALK:POUR 4IN.CONC	16592		2154	10126		28872	.186	2K00 8
		2825 SY	5.873		.762	3.584		10.220		
2K00	9	ACCESS WALKWAYS	7465	530	2441			10436	.067	2K00 9
		16 DA	466.563	33.125	152.563			652.250		
2K00	ITEM	RESTORATION	66599	9469	7573	35626	14817	134084	.862	2K00 ITEM
2N00	1	FIXED EXPENSE	100800	46000	228056			374856	2.409	2N00 1
2N00	ITEM	OVERHEAD-FIXED COSTS	100800	46000	228056			374856	2.409	2N00 ITEM
20MQ	1	OVERHEAD LABOR	1385800		97006			1482806	9.529	20MQ 1
		36 MO	38494.444		2694.611			41189.056		
20MQ	2	OVERHEAD EXPENSES			432000			432000	2.776	20MQ 2
		36 MO			12000.000			12000.000		

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
20MQ 3	GENERAL SERVICE CREW	966402	82138	67648			1116188	7.173	20MQ 3
	640 DA	1510.003	128.341	105.700			1744.044		
20MQ 4	VEHICLE OPERATION		42300				42300	.272	20MQ 4
	36 MO		1175.000				1175.000		
20MQ ITEM	OVERHEAD-TIME RELATED	2352202	124438	596654			3073294	19.750	20MQ ITEM
	36 MO	65338.944	3456.611	16573.722			85369.278		
2P00 1	FIXED PLANT EXPENSES	119720	29000	117480		23800	290000	1.864	2P00 1
2P00 ITEM	PLANT-FIXED COSTS	119720	29000	117480		23800	290000	1.864	2P00 ITEM
2QMQ 1	PLANT-TIME RELATED		12800	216900			229700	1.476	2QMQ 1
	36 MO		355.556	6025.000			6380.556		
2QMQ ITEM	PLANT-TIME RELATED		12800	216900			229700	1.476	2QMQ ITEM
	36 MO		355.556	6025.000			6380.556		

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	5801725	1293818	3114461	3225644	2125692	15561340	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 1-3GY

RAPID TRANSIT LINE SECTION
SITE 1 - 70' DEPTH
SOLDIER PILE & LAGGING GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

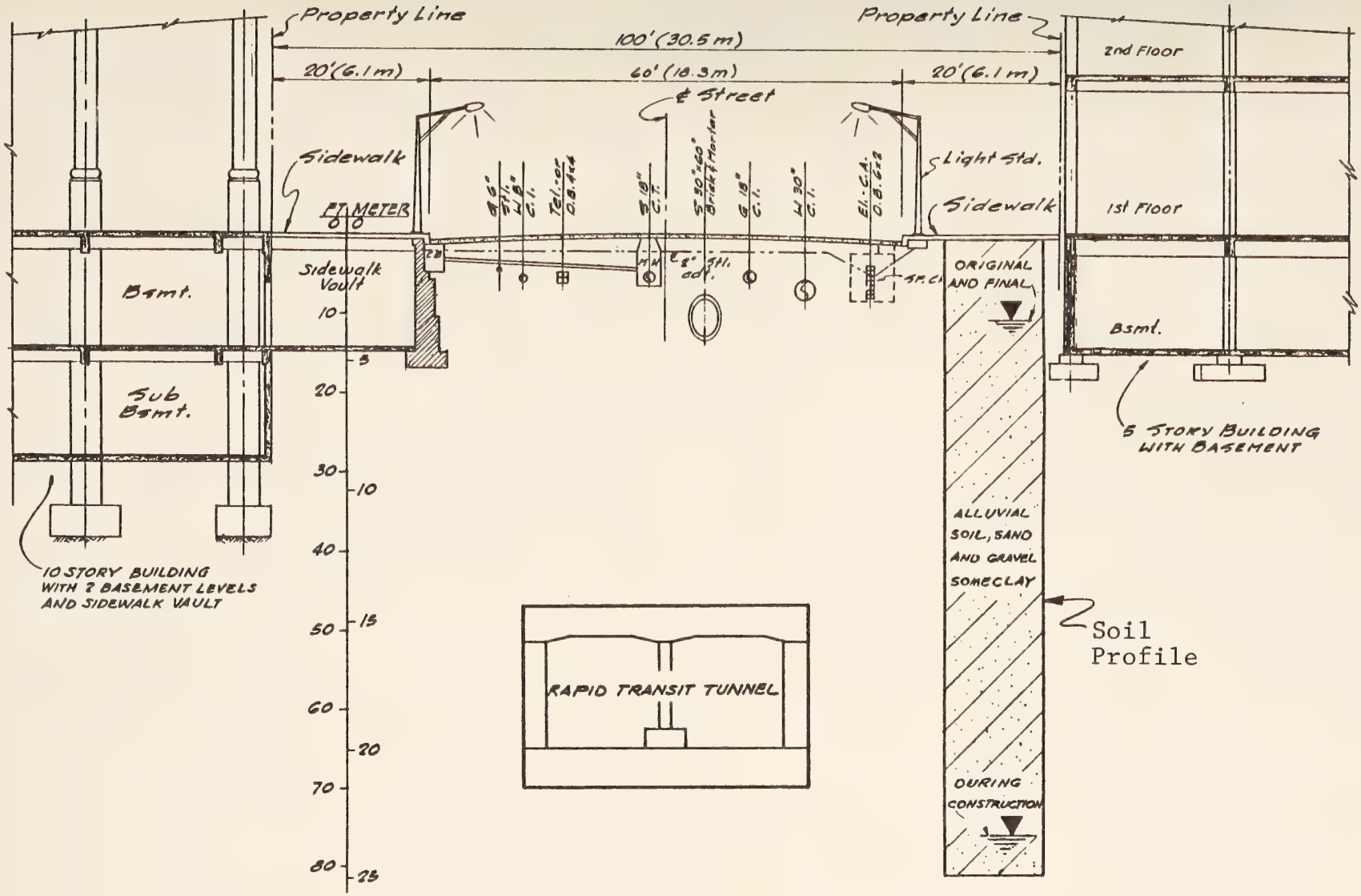


Figure 9. PROJECT 1-3GY - TRANSIT TUNNEL
SITE 1 - 70' DEPTH
SOLDIER PILES & LAGGING - INTERNAL BRACING

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	5400108	1169265	4084314	2653733	2301035	15608455	100.000
PROJECT						15608455	100.000

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3A00 1	CONST BARRICADES,ETC	37557	1037	25799			64393	.413	3A00 1
	40 DA	938.925	25.925	644.975			1609.825		
3A00 2	SET & MOVE BARRIC,ETC	19205	1812	3514			24531	.157	3A00 2
	30 DA	640.167	60.400	117.133			817.700		
3A00 3	FLAGMEN-DIRECT TRAFFIC	30944		2166			33110	.212	3A00 3
	200 DA	154.720		10.830			165.550		
3A00 ITEM	TRAFFIC CONTROL	87706	2849	31479			122034	.782	3A00 ITEM
3BA0 21	UTILITY SUPPORT LONG.	69531	11040	69713			150284	.963	3BA0 21
	2000 LF	34.766	5.520	34.857			75.142		
3BA0 22	UTILITY SUPPORT INTER.	22477	1586	18648			42711	.274	3BA0 22
	4 EA	5619.250	396.500	4662.000			10677.750		
3BA0 23	STORM DR&SEW.TEMP.LONG	44693	5520	39129			89342	.572	3BA0 23
	4000 LF	11.173	1.380	9.782			22.336		
3BA0 24	STORM DR&SEW.PERM.LONG					180000	180000	1.153	3BA0 24
	4000 LF					45.000	45.000		
3BA0 26	SEWER PERM.LONGITUD.					49200	49200	.315	3BA0 26
	4000 LF					12.300	12.300		
3BA0 28	SEW. 18IN PERM. INTER.					3936	3936	.025	3BA0 28
	4 EA					984.000	984.000		
3BA0 30	STM.DR.LATER.PERM.LONG					2400	2400	.015	3BA0 30
	8 EA					300.000	300.000		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3BA0 32	STM.DR.LATER.PERM.INT.					2400	2400	.015	3BA0 32
	8 EA					300.000	300.000		
3BA0 33	PERM.BUILDING LATERALS					3667	3667	.023	3BA0 33
	55 EA					66.673	66.673		
3BA0 35	MANHOLES SEW.PERM.LONG					9200	9200	.059	3BA0 35
	8 EA					1150.000	1150.000		
3BA0 37	MANHOLES SEW.PERM.INT.					4600	4600	.029	3BA0 37
	4 EA					1150.000	1150.000		
3BA0 41	WAT.MAIN 30IN CI LONG.					200000	200000	1.281	3BA0 41
	2000 LF					100.000	100.000		
3BA0 42	WATER 8IN LONGITUDINAL					70300	70300	.450	3BA0 42
	2000 LF					35.150	35.150		
3BA0 43	WATER 8IN INTERSECTION					18896	18896	.121	3BA0 43
	4 EA					4724.000	4724.000		
3BA0 51	GAS MAIN TEMP.LONG.					150000	150000	.961	3BA0 51
	2000 LF					75.000	75.000		
3BA0 52	GAS MAIN.PERM.LONG.					90000	90000	.577	3BA0 52
	2000 LF					45.000	45.000		
3BA0 53	GAS LINE 6IN.INTERSECT					4344	4344	.028	3BA0 53
	4 EA					1086.000	1086.000		
3BA0 61	TELEPH.4X4 DUCT LONGIT					58500	58500	.375	3BA0 61
	2000 LF					29.250	29.250		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3BA0 62	TELEPH.4X4 DUCT INTER.					4680	4680	.030	3BA0 62
	4 EA					1170.000	1170.000		
3BA0 63	TELEPHONE MANHOLE LONG					39960	39960	.256	3BA0 63
	4 EA					9990.000	9990.000		
3BA0 64	TELEPHONE MANHOLE INT.					39960	39960	.256	3BA0 64
	4 EA					9990.000	9990.000		
3BA0 72	ELECT.DUCT 2X6 INTER.			2654			2654	.017	3BA0 72
	4 EA			663.500			663.500		
3BA0 73	ST.LT&TR.SIG.COND.INT.					5000	5000	.032	3BA0 73
	4 EA					1250.000	1250.000		
3BA0 80	BLDG. LATERAL CONNECT.					27500	27500	.176	3BA0 80
	55 EA					500.000	500.000		
3BA0 81	REMOVE UTILITIES SUPP.	16376		1146			17522	.112	3BA0 81
	2000 LF	8.188		.573			8.761		
3BA0 ITEM	UTILITY WORK	153077	18146	131290		964543	1267056	8.118	3BA0 ITEM
3C00 1	GENL EXTERIOR PROTECT	21501	6955	7550			36006	.231	3C00 1
	40 DA	537.525	173.875	188.750			900.150		
3C00 ITEM	PROTECT ADJ STRUCTURES	21501	6955	7550			36006	.231	3C00 ITEM
3DAY 1	FURNISH,INSTALL&REMOVE					566708	566708	3.631	3DAY 1

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3DAY 2	MAINT SYST-FIRST 6 MOS					183684	183684	1.177	3DAY 2
	6 MO					30614.000	30614.000		
3DAY 3	MAINT SYST- AFTER 6 MO					222957	222957	1.428	3DAY 3
	7 MO					31851.000	31851.000		
3DAY ITEM	CONTROL GROUND WATER					973349	973349	6.236	3DAY ITEM
3E00 6	PILE CAPS,WALES,DECKBM	117721	25790	672240			815751	5.226	3E00 6
	1328 TON	88.645	19.420	506.205			614.270		
3E00 7	LATERAL & SWAY BRACING	51436	9233	73601			134270	.860	3E00 7
	100 TON	514.360	92.330	736.010			1342.700		
3E00 8	DECK MATS & TIMBERS	37374	2760	329271			369405	2.367	3E00 8
	9333 SY	4.005	.296	35.280			39.581		
3E00 11	REMOVE TIMBER DECKING	20844	3220	1459			25523	.164	3E00 11
	9333 SY	2.233	.345	.156			2.735		
3E00 12	REMOVE DECK BEAMS	29984	12814	2099			44897	.288	3E00 12
	961 TON	31.201	13.334	2.184			46.719		
3E00 13	REMOVE WALES & CAPS	33030	14115	2312			49457	.317	3E00 13
	467 TON	70.728	30.225	4.951			105.904		
3E00 14	REM.LAG.& PILES TO -6	31831	8611	2228			42670	.273	3E00 14
	4000 LF	7.958	2.153	.557			10.668		
3E00 ITEM	STREET DECKING	322220	76543	1083210			1481973	9.495	3E00 ITEM
	9333 SY	34.525	8.201	116.062			158.788		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3FAQ 1	TRENCH FOR SOLD PILES	88368	12400	10586			111354	.713	3FAQ 1
	4000 LF	22.092	3.100	2.647			27.839		
3FAQ 2	DRILL HOLES FOR PILES	85569	101347	20340			207256	1.328	3FAQ 2
	41000 LF	2.087	2.472	.496			5.055		
3FAQ 3	SPLICE,PLACE,TRIM PILE	101382	37365	469097			607844	3.894	3FAQ 3
	500 EA	202.764	74.730	938.194			1215.688		
3FAQ 4	BACKFILL PILE HOLES	32981	8273	48839			90093	.577	3FAQ 4
	500 EA	65.962	16.546	97.678			180.186		
3FAQ 5	PLACE LAGGING	336999	30913	252390			620302	3.974	3FAQ 5
	280000 SF	1.204	.110	.901			2.215		
3FAQ ITEM	GROUND SUPPORT WALL	645299	190298	801252			1636849	10.487	3FAQ ITEM
	31111 SY	20.742	6.117	25.755			52.613		
3GEQ 1	SET BRACING LEVEL NO 2	57415	16748	273519			347682	2.228	3GEQ 1
	539 TON	106.521	31.072	507.456			645.050		
3GEQ 2	PRESTRESS LEVEL NO 2	13225	308	926			14459	.093	3GEQ 2
	539 TON	24.536	.571	1.718			26.826		
3GEQ 3	SET BRACING LEVEL NO 3	53260	15536	253728			322524	2.066	3GEQ 3
	500 TON	106.520	31.072	507.456			645.048		
3GEQ 4	PRESTRESS LEVEL NO 3	12268	286	859			13413	.086	3GEQ 4
	500 TON	24.536	.572	1.718			26.826		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3GEQ 5	SET BRACING LEVEL NO 4	54751	15971	260833			331555	2.124	3GEQ 5
	514 TON	106.519	31.072	507.457			645.049		
3GEQ 6	PRESTRESS LEVEL NO 4	12611	294	883			13788	.088	3GEQ 6
	514 TON	24.535	.572	1.718			26.825		
3GEQ 7	SET BRACING LEVEL NO 5	47870	13964	171851			233685	1.497	3GEQ 7
	337 TON	142.047	41.436	509.944			693.427		
3GEQ 8	PRESTRESS LEVEL NO 5	11027	257	772			12056	.077	3GEQ 8
	337 TON	32.721	.763	2.291			35.774		
3GEQ 11	REMOVE BRACING LEVEL 5	17531	7363	1227			26121	.167	3GEQ 11
	337 TON	52.021	21.849	3.641			77.510		
3GEQ 12	REMOVE BRACING LEVEL 4	26738	11229	1872			39839	.255	3GEQ 12
	514 TON	52.019	21.846	3.642			77.508		
3GEQ 13	REMOVE BRACING LEVEL 3	26010	10924	1821			38755	.248	3GEQ 13
	500 TON	52.020	21.848	3.642			77.510		
3GEQ 14	REMOVE BRACING LEVEL 2	28039	11776	1963			41778	.268	3GEQ 14
	539 TON	52.020	21.848	3.642			77.510		
3GEQ ITEM	INTERNAL BRACING	360745	104656	970254			1435655	9.198	3GEQ ITEM
	1890 TON	190.870	55.374	513.362			759.606		
3HEQ 1	BREAK PAVEMENT & HAUL	18784	7817	1315			27916	.179	3HEQ 1
	8000 SY	2.348	.977	.164			3.490		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3HEQ 2	EXCAVATE FIRST 5 FT	71779	34675	5025			111479	.714	3HEQ 2
	13300 CY	5.397	2.607	.378			8.382		
3HEQ 3	EXCAVATE 5 TO 22 FT	115243	86606	8067			209916	1.345	3HEQ 3
	45300 CY	2.544	1.912	.178			4.634		
3HEQ 4	EXCAVATE 22 TO 30 FT	52406	56505	3668			112579	.721	3HEQ 4
	21300 CY	2.460	2.653	.172			5.285		
3HEQ 5	EXCAVATE 30 TO 50 FT	113647	144390	7955			265992	1.704	3HEQ 5
	53400 CY	2.128	2.704	.149			4.981		
3HEQ 6	EXCAVATE 50 TO 70 FT	126268	160423	8839			295530	1.893	3HEQ 6
	53400 CY	2.365	3.004	.166			5.534		
3HEQ 7	FINE GRADE INVERT	34391	15773	2407			52571	.337	3HEQ 7
	8000 SY	4.299	1.972	.301			6.571		
3HEQ ITEM	EXCAVATION	532518	506189	37276			1075983	6.894	3HEQ ITEM
	186700 CY	2.852	2.711	.200			5.763		
3IAR 1	LEVELING SLAB FORMS	11966		3358			15324	.098	3IAR 1
	20 EA	598.300		167.900			766.200		
3IAR 2	POUR LEVELING SLAB	26134	2669	1829	25623		56255	.360	3IAR 2
	860 CY	30.388	3.103	2.127	29.794		65.413		
3IAR 3	BASE SLAB REBAR	185224	13248	12966	449400		660838	4.234	3IAR 3
	1070 TON	173.107	12.381	12.118	420.000		617.606		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3IAR 4	BASE SLAB BULKHEADS	43079		5831			48910	.313	3IAR 4
	7200 SF	5.983		.810			6.793		
3IAR 5	BASE SLAB-POUR,CLEANUP	135109	13798	9458	402875		561240	3.596	3IAR 5
	13340 CY	10.128	1.034	.709	30.201		42.072		
3IAR 6	FORM CENTER WALKWAY	29916		4396			34312	.220	3IAR 6
	10000 SF	2.992		.440			3.431		
3IAR 7	POUR CENTER WALKWAY	24879	2541	1742	27835		56997	.365	3IAR 7
	920 CY	27.042	2.762	1.893	30.255		61.953		
3IAR 8	ASSEM STEEL WL&RF FORM	21406	1947	75948			99301	.636	3IAR 8
	20 DA	1070.300	97.350	3797.400			4965.050		
3IAR 9	PLACE OUTER WALL W.P.	14754		1033	30360		46147	.296	3IAR 9
	10200 SY	1.446		.101	2.976		4.524		
3IAR 10	WALL REBAR	103869	6436	7271	216300		333876	2.139	3IAR 10
	515 TON	201.687	12.497	14.118	420.000		648.303		
3IAR 11	MOVE & SET STEEL FORMS	197840		19791			217631	1.394	3IAR 11
	2000 LF	98.920		9.896			108.816		
3IAR 12	ROOF SLAB REBAR	214578	13296	15020	349020		591914	3.792	3IAR 12
	831 TON	258.217	16.000	18.075	420.000		712.291		
3IAR 13	POUR WALLS & ROOF SLAB	67561	6900	4729	541464		620654	3.976	3IAR 13
	17940 CY	3.766	.385	.264	30.182		34.596		
3IAR 14	TRACK INVERT FILL CONC	35693	5077	3339	60944		105053	.673	3IAR 14
	1980 CY	18.027	2.564	1.686	30.780		53.057		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3IAR 15	ELECTRICAL EMBEDDED					150000	150000	.961	3IAR 15
3IAR 16	MECHANICAL EMBEDDED					70000	70000	.448	3IAR 16
3IAR 17	PATCH & POINT WLS & RF	32633		2284	1830		36747	.235	3IAR 17
	160000 SF	.204		.014	.011		.230		
3IAR 18	PLACE ROOF WATERPROOF					82000	82000	.525	3IAR 18
	8000 SY					10.250	10.250		
3IAR 19	MORTAR PROT.FOR W.P.	24845	446	2579	34502		62372	.400	3IAR 19
	860 CY	28.890	.519	2.999	40.119		72.526		
3IAR 20	CLEAN UP STRUCTURE	11829	662	828			13319	.085	3IAR 20
	20 DA	591.450	33.100	41.400			665.950		
3IAR ITEM	CONSTRUCT PERM STRUCT	1181315	67020	172402	2140153	302000	3862890	24.749	3IAR ITEM
	35040 CY	33.713	1.913	4.920	61.077	8.619	110.242		
3JEQ 1	BACKFILL & TAMP 2 FT	31057	1380	2174	21200		55811	.358	3JEQ 1
	5300 CY	5.860	.260	.410	4.000		10.530		
3JEQ 2	BACKFILL & TAMP 2-22FT	120255	14937	8418	213600		357210	2.289	3JEQ 2
	53300 CY	2.256	.280	.158	4.008		6.702		
3JEQ 3	BACKFILL & TMP 22-41FT	98053	12180	6864	202800		319897	2.050	3JEQ 3
	50700 CY	1.934	.240	.135	4.000		6.310		
3JEQ 4	BACKFILL & TMP.TOP 5FT	90025	11183	6302	53200		160710	1.030	3JEQ 4
	13300 CY	6.769	.841	.474	4.000		12.083		
3JEQ ITEM	BACKFILL	339390	39680	23758	490800		893628	5.725	3JEQ ITEM
	122600 CY	2.768	.324	.194	4.003		7.289		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3K00	1	PLACE 6IN SUBGRADE	11488	3163	804	13900		29355	.188	3K00 1
		11110 SY	1.034	.285	.072	1.251		2.642		
3K00	2	PLACE 4IN BASE COURSE	11488	3163	804	8880		24335	.156	3K00 2
		11110 SY	1.034	.285	.072	.799		2.190		
3K00	3	STREET PAVING					42343	42343	.271	3K00 3
		13350 SY					3.172	3.172		
3K00	ITEM	STREET RESTORATION	22976	6326	1608	22780	42343	96033	.615	3K00 ITEM
		13350 SY	1.721	.474	.120	1.706	3.172	7.193		
3NA0	1	FIXED EXPENSES	67200	30000	193504			290704	1.862	3NA0 1
3NA0	ITEM	OVERHEAD-FIXED COSTS	67200	30000	193504			290704	1.862	3NA0 ITEM
3OGQ	1	OVERHEAD LABOR	858600		60102			918702	5.886	3OGQ 1
		28 MO	30664.286		2146.500			32810.786		
3OGQ	2	OVERHEAD EXPENSES			303800			303800	1.946	3OGQ 2
		28 MO			10850.000			10850.000		
3OGQ	3	GENERAL SERVICE CREW	724801	61603	50736			837140	5.363	3OGQ 3
		480 DA	1510.002	128.340	105.700			1744.042		
3OGQ	4	VEHICLE OPERATION		28000				28000	.179	3OGQ 4
		28 MO		1000.000				1000.000		
3OGQ	ITEM	OVERHEAD-TIME RELATED	1583401	89603	414638			2087642	13.375	3OGQ ITEM
		28 MO	56550.036	3200.107	14808.500			74558.643		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3PA0 1	FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	1.322	3PA0 1
3PA0 ITEM	PLANT-FIXED COSTS	82760	25000	79793		18800	206353	1.322	3PA0 ITEM
3QGQ 1	TIME RELATED COSTS		6000	136300			142300	.912	3QGQ 1
	28 MO		214.286	4867.857			5082.143		
3QGQ ITEM	PLANT-TIME RELATED		6000	136300			142300	.912	3QGQ ITEM
	28 MO		214.286	4867.857			5082.143		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	5400108	1169265	4084314	2653733	2301035	15608455	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 3-3JY

RAPID TRANSIT LINE SECTION
SITE 3 - 70' DEPTH
CAST-IN-SLURRY CONCRETE (SPTC) GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

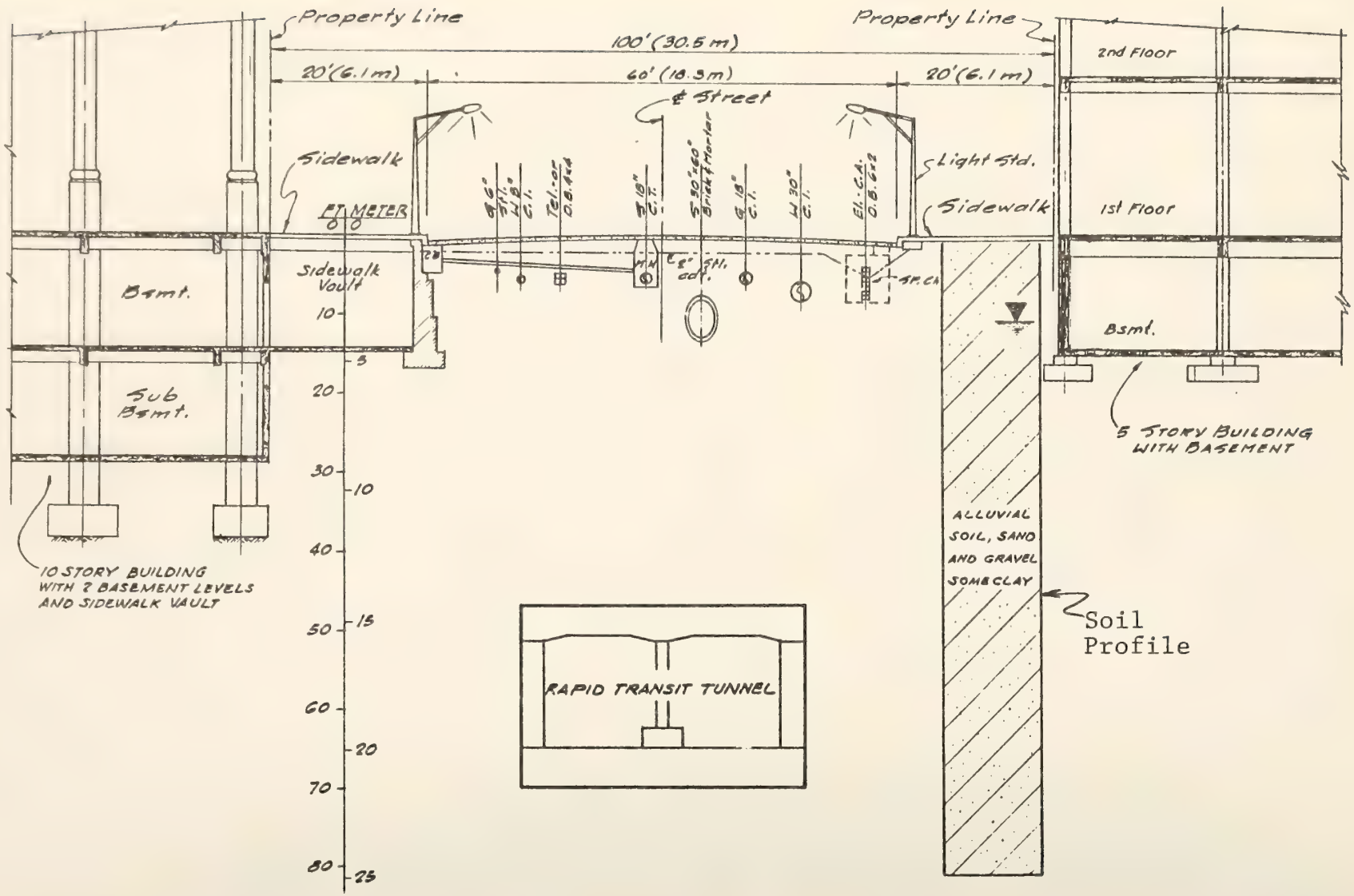


Figure 10. PROJECT 3-3JY - TRANSIT TUNNEL
SITE 3 - 70' DEPTH
CAST-IN-SLURRY (SPTC) - INTERNAL BRACING

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 3-3JY

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6009468	1636978	6197395	2140838	2824375	18809054	100.000
PROJECT						18809054	100.000

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 3-3JY

			TOTAL COST ANALYSIS			PROJECT SUMMARY				
			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3A00	1	CONST BARRICADES,ETC	37557	1037	25799			64393	.342	3A00 1
		40 DA	938.925	25.925	644.975			1609.825		
3A00	2	SET & MOVE BARRIC,ETC	19205	1812	3514			24531	.130	3A00 2
		30 DA	640.167	60.400	117.133			817.700		
3A00	3	FLAGMEN-DIRECT TRAFFIC	30944		2166			33110	.176	3A00 3
		200 DA	154.720		10.830			165.550		
3A00	ITEM	TRAFFIC CONTROL	87706	2849	31479			122034	.649	3A00 ITEM
3BD1	1	ALL OPERATIONS	153077	18146	131290		1465211	1767724	9.398	3BD1 1
3BD1	ITEM	UTILITY WORK-ALTERNATE	153077	18146	131290		1465211	1767724	9.398	3BD1 ITEM
3C00	1	GENL EXTERIOR PROTECT	21501	6955	7550			36006	.191	3C00 1
		40 DA	537.525	173.875	188.750			900.150		
3C00	ITEM	PROTECT ADJ STRUCTURES	21501	6955	7550			36006	.191	3C00 ITEM
3DDY	1	F.I.&R. PUMP SYSTEM					297829	297829	1.583	3DDY 1
3DDY	2	F.I.&R. RECHARGE SYST					294270	294270	1.565	3DDY 2
3DDY	3	MAINT SYST-FIRST 6 MOS					183219	183219	.974	3DDY 3
		6 MO					30536.500	30536.500		
3DDY	4	MAINT SYST-AFTER 6 MOS					220703	220703	1.173	3DDY 4
		7 MO					31529.000	31529.000		
3DDY	ITEM	CONTROL GROUNDWATER					996021	996021	5.295	3DDY ITEM

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 3-3JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3E00 6	PILE CAPS,WALES,DECKBM	116501	25522	583155			725178	3.855	3E00 6
	1150 TON	101.305	22.193	507.091			630.590		
3E00 7	LATERAL & SWAY BRACING	51436	9233	73601			134270	.714	3E00 7
	100 TON	514.360	92.330	736.010			1342.700		
3E00 8	DECK MATS & TIMBERS	37257	2751	313723			353731	1.881	3E00 8
	8889 SY	4.191	.309	35.293			39.794		
3E00 11	REMOVE TIMBER DECKING	19854	3067	1390			24311	.129	3E00 11
	8889 SY	2.234	.345	.156			2.735		
3E00 12	REMOVE DECK BEAMS	28712	12270	2010			42992	.229	3E00 12
	920 TON	31.209	13.337	2.185			46.730		
3E00 13	REMOVE WALES & CAPS	23343	9975	1634			34952	.186	3E00 13
	330 TON	70.736	30.227	4.952			105.915		
3E00 14	REM.LAG.& PILES TO -6	31831	8611	2228			42670	.227	3E00 14
	4000 LF	7.958	2.153	.557			10.668		
3E00 ITEM	STREET DECKING	308934	71429	977741			1358104	7.220	3E00 ITEM
	8889 SY	34.755	8.036	109.994			152.785		
3FBY 1	MOB.SLURRY PLT.&EQUIP.	17083	30490	1196			48769	.259	3FBY 1
	30 DA	569.433	1016.333	39.867			1625.633		
3FBY 2	TRENCH @ WALL LOCATION	88368	12400	10586			111354	.592	3FBY 2
	4000 LF	22.092	3.100	2.647			27.839		

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 3-3JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3FBY 3	DRILL HOLES FOR PILES	100149	118613	7010			225772	1.200	3FBY 3
	36740 LF	2.726	3.228	.191			6.145		
3FBY 4	SPLICE,PLACE,TRIM PILE	135449	49921	1120481			1305851	6.943	3FBY 4
	668 EA	202.768	74.732	1677.367			1954.867		
3FBY 5	EXCAV. BETWEEN PILES	248648	317595	17405			583648	3.103	3FBY 5
	48889 CY	5.086	6.496	.356			11.938		
3FBY 6	OPERATE SLURRY EQUIP.	209472	47309	130513			387294	2.059	3FBY 6
	480 SH	436.400	98.560	271.902			806.863		
3FBY 7	PLACE TREMIE CONC.	240588	95471	1347791			1683850	8.952	3FBY 7
	44445 CY	5.413	2.148	30.325			37.886		
3FBY 8	DEMOB. SLURRY EQUIP.	9927	2816	695			13438	.071	3FBY 8
	10 DA	992.700	281.600	69.500			1343.800		
3FBY 9	PLACE LAGGING 1ST.10FT	57770	5299	30444			93513	.497	3FBY 9
	40000 SF	1.444	.132	.761			2.338		
3FBY 10	CLEAN&PATCH SPTC WALL	70733	15869	5871			92473	.492	3FBY 10
	180 DA	392.961	88.161	32.617			513.739		
3FBY ITEM	GROUND SUPPORT WALL	1178187	695783	2671992			4545962	24.169	3FBY ITEM
	31111 SY	37.870	22.365	85.886			146.121		
3GEQ 1	SET BRACING LEVEL NO 2	59353	17313	296655			373321	1.985	3GEQ 1
	585 TON	101.458	29.595	507.103			638.156		

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 3-3JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3GEQ 2	PRESTRESS LEVEL NO 2	13671	319	957			14947	.079	3GEQ 2
	585 TON	23.369	.545	1.636			25.550		
3GEQ 3	SET BRACING LEVEL NO 3	53473	15599	267243			336315	1.788	3GEQ 3
	527 TON	101.467	29.600	507.102			638.169		
3GEQ 4	PRESTRESS LEVEL NO 3	12317	287	862			13466	.072	3GEQ 4
	527 TON	23.372	.545	1.636			25.552		
3GEQ 5	SET BRACING LEVEL NO 4	62315	18177	355362			435854	2.317	3GEQ 5
	702 TON	88.768	25.893	506.214			620.875		
3GEQ 6	PRESTRESS LEVEL NO 4	14354	335	1005			15694	.083	3GEQ 6
	702 TON	20.447	.477	1.432			22.356		
3GEQ 7	SET BRACING LEVEL NO 5	59566	17375	325670			402611	2.141	3GEQ 7
	643 TON	92.638	27.022	506.485			626.145		
3GEQ 8	PRESTRESS LEVEL NO 5	13721	320	960			15001	.080	3GEQ 8
	643 TON	21.339	.498	1.493			23.330		
3GEQ 11	REMOVE BRACING LEVEL 5	33449	14048	2341			49838	.265	3GEQ 11
	643 TON	52.020	21.848	3.641			77.509		
3GEQ 12	REMOVE BRACING LEVEL 4	36517	15337	2556			54410	.289	3GEQ 12
	702 TON	52.019	21.848	3.641			77.507		
3GEQ 13	REMOVE BRACING LEVEL 3	27413	11514	1919			40846	.217	3GEQ 13
	527 TON	52.017	21.848	3.641			77.507		
3GEQ 14	REMOVE BRACING LEVEL 2	30431	12781	2130			45342	.241	3GEQ 14
	585 TON	52.019	21.848	3.641			77.508		
3GEQ ITEM	INTERNAL BRACING	416580	123405	1257660			1797645	9.557	3GEQ ITEM
	2457 TON	169.548	50.226	511.868			731.642		

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 3-3JY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3HEQ 1	BREAK PAVEMENT & HAUL	16671	6937	1167			24775	.132	3HEQ 1
	7100 SY	2.348	.977	.164			3.489		
3HEQ 2	EXCAVATE FIRST 5 FT	64222	31026	4496			99744	.530	3HEQ 2
	11900 CY	5.397	2.607	.378			8.382		
3HEQ 3	EXCAVATE 5 TO 22 FT	102524	77046	7177			186747	.993	3HEQ 3
	40300 CY	2.544	1.912	.178			4.634		
3HEQ 4	EXCAVATE 22 TO 30 FT	46747	50403	3272			100422	.534	3HEQ 4
	19000 CY	2.460	2.653	.172			5.285		
3HEQ 5	EXCAVATE 30 TO 50 FT	100878	128165	7061			236104	1.255	3HEQ 5
	47400 CY	2.128	2.704	.149			4.981		
3HEQ 6	EXCAVATE 50 TO 70 FT	112094	142416	7847			262357	1.395	3HEQ 6
	47400 CY	2.365	3.005	.166			5.535		
3HEQ 7	FINE GRADE INVERT	30522	13998	2137			46657	.248	3HEQ 7
	7100 SY	4.299	1.972	.301			6.571		
3HEQ ITEM	EXCAVATION	473658	449991	33157			956806	5.087	3HEQ ITEM
	166000 CY	2.853	2.711	.200			5.764		
3IBR 1	LEVELING SLAB FORMS	11966		3358			15324	.081	3IBR 1
	20 EA	598.300		167.900			766.200		
3IBR 2	POUR LEVELING SLAB	27040	2762	1893	23268		54963	.292	3IBR 2
	780 CY	34.667	3.541	2.427	29.831		70.465		

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 3-3JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3IBR 3	BASE SLAB REBAR	185039	13235	12953	402780		614007	3.264	3IBR 3
	959 TON	192.950	13.801	13.507	420.000		640.258		
3IBR 4	BASE SLAB BULKHEADS	38293		5376			43669	.232	3IBR 4
	6400 SF	5.983		.840			6.823		
3IBR 5	BASE SLAB-POUR,CLEANUP	135204	13808	9464	357929		516405	2.746	3IBR 5
	11860 CY	11.400	1.164	.798	30.180		43.542		
3IBR 6	FORM CENTER WALKWAY	29916		4396			34312	.182	3IBR 6
	10000 SF	2.992		.440			3.431		
3IBR 7	POUR CENTER WALKWAY	24879	2541	1742	27835		56997	.303	3IBR 7
	920 CY	27.042	2.762	1.893	30.255		61.953		
3IBR 8	ASSEM STEEL WL&RF FORM	21406	1947	75948			99301	.528	3IBR 8
	20 DA	1070.300	97.350	3797.400			4965.050		
3IBR 10	WALL REBAR	65660	4068	4596	90300		164624	.875	3IBR 10
	215 TON	305.395	18.921	21.377	420.000		765.693		
3IBR 11	MOVE & SET STEEL FORMS	197840		19791			217631	1.157	3IBR 11
	2000 LF	98.920		9.896			108.816		
3IBR 12	ROOF SLAB REBAR	213808	13248	14967	306600		548623	2.917	3IBR 12
	730 TON	292.888	18.148	20.503	420.000		751.538		
3IBR 13	POUR WALLS & ROOF SLAB	67602	6904	4732	380314		459552	2.443	3IBR 13
	12600 CY	5.365	.548	.376	30.184		36.472		
3IBR 14	TRACK INVERT FILL CONC	35693	5077	3339	60944		105053	.559	3IBR 14
	1980 CY	18.027	2.564	1.686	30.780		53.057		

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 3-3JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3IBR 15	ELECTRICAL EMBEDDED					150000	150000	.797	3IBR 15
3IBR 16	MECHANICAL EMBEDDED					70000	70000	.372	3IBR 16
3IBR 17	PATCH & POINT WLS & RF	32633		2284	1830		36747	.195	3IBR 17
	160000 SF	.204		.014	.011		.230		
3IBR 18	PLACE ROOF WATERPROOF					82000	82000	.436	3IBR 18
	8000 SY					10.250	10.250		
3IBR 19	MORTAR PROT.FOR W.P.	25707	462	2639	30258		59066	.314	3IBR 19
	780 CY	32.958	.592	3.383	38.792		75.726		
3IBR 20	CLEAN UP STRUCTURE	11829	662	828			13319	.071	3IBR 20
	20 DA	591.450	33.100	41.400			665.950		
3IBR ITEM	CONSTRUCT PERM STRUCT	1124515	64714	168306	1682058	302000	3341593	17.766	3IBR ITEM
	28140 CY	39.961	2.300	5.981	59.775	10.732	118.749		
3JEQ 1	BACKFILL & TAMP 2 FT	27543	1224	1928	18800		49495	.263	3JEQ 1
	4700 CY	5.860	.260	.410	4.000		10.531		
3JEQ 2	BACKFILL & TAMP 2-22FT	106947	13285	7486	189600		317318	1.687	3JEQ 2
	47400 CY	2.256	.280	.158	4.000		6.694		
3JEQ 3	BACKFILL & TMP 22-41FT	87034	10811	6092	180000		283937	1.510	3JEQ 3
	45000 CY	1.934	.240	.135	4.000		6.310		
3JEQ 4	BACKFILL & TMP.TOP 5FT	80548	10006	5638	47600		143792	.764	3JEQ 4
	11900 CY	6.769	.841	.474	4.000		12.083		
3JEQ ITEM	BACKFILL	302072	35326	21144	436000		794542	4.224	3JEQ ITEM
	109000 CY	2.771	.324	.194	4.000		7.289		

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 3-3JY

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3K00	1	PLACE 6IN SUBGRADE	11488	3163	804	13900		29355	.156	3K00 1
		11110 SY	1.034	.285	.072	1.251		2.642		
3K00	2	PLACE 4IN BASE COURSE	11488	3163	804	8880		24335	.129	3K00 2
		11110 SY	1.034	.285	.072	.799		2.190		
3K00	3	STREET PAVING					42343	42343	.225	3K00 3
		13350 SY					3.172	3.172		
3K00	ITEM	STREET RESTORATION	22976	6326	1608	22780	42343	96033	.511	3K00 ITEM
		13350 SY	1.721	.474	.120	1.706	3.172	7.193		
3N00	1	FIXED EXPENSES	67200	30000	204704			301904	1.605	3N00 1
3N00	ITEM	OVERHEAD-FIXED COSTS	67200	30000	204704			301904	1.605	3N00 ITEM
3OJQ	1	OVERHEAD LABOR	954900		66843			1021743	5.432	3OJQ 1
		31 MO	30803.226		2156.226			32959.452		
3OJQ	2	OVERHEAD EXPENSES			334850			334850	1.780	3OJQ 2
		31 MO			10801.613			10801.613		
3OJQ	3	GENERAL SERVICE CREW	815402	69304	57078			941784	5.007	3OJQ 3
		540 DA	1510.004	128.341	105.700			1744.044		
3OJQ	4	VEHICLE OPERATION		31000				31000	.165	3OJQ 4
		31 MO		1000.000				1000.000		
3OJQ	ITEM	OVERHEAD-TIME RELATED	1770302	100304	458771			2329377	12.384	3OJQ ITEM
		31 MO	57106.516	3235.613	14799.065			75141.194		

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 3-3JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3P00 1	FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	1.097	3P00 1
3P00 ITEM	PLANT-FIXED COSTS	82760	25000	79793		18800	206353	1.097	3P00 ITEM
3QJQ 1	TIME RELATED COSTS		6750	152200			158950	.845	3QJQ 1
	31 MO		217.742	4909.677			5127.419		
3QJQ ITEM	PLANT-TIME RELATED		6750	152200			158950	.845	3QJQ ITEM
	31 MO		217.742	4909.677			5127.419		

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT DOT 3-3JY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6009468	1636978	6197395	2140838	2824375	18809054	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 4-3LY

RAPID TRANSIT LINE SECTION
SITE 4 - 70' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

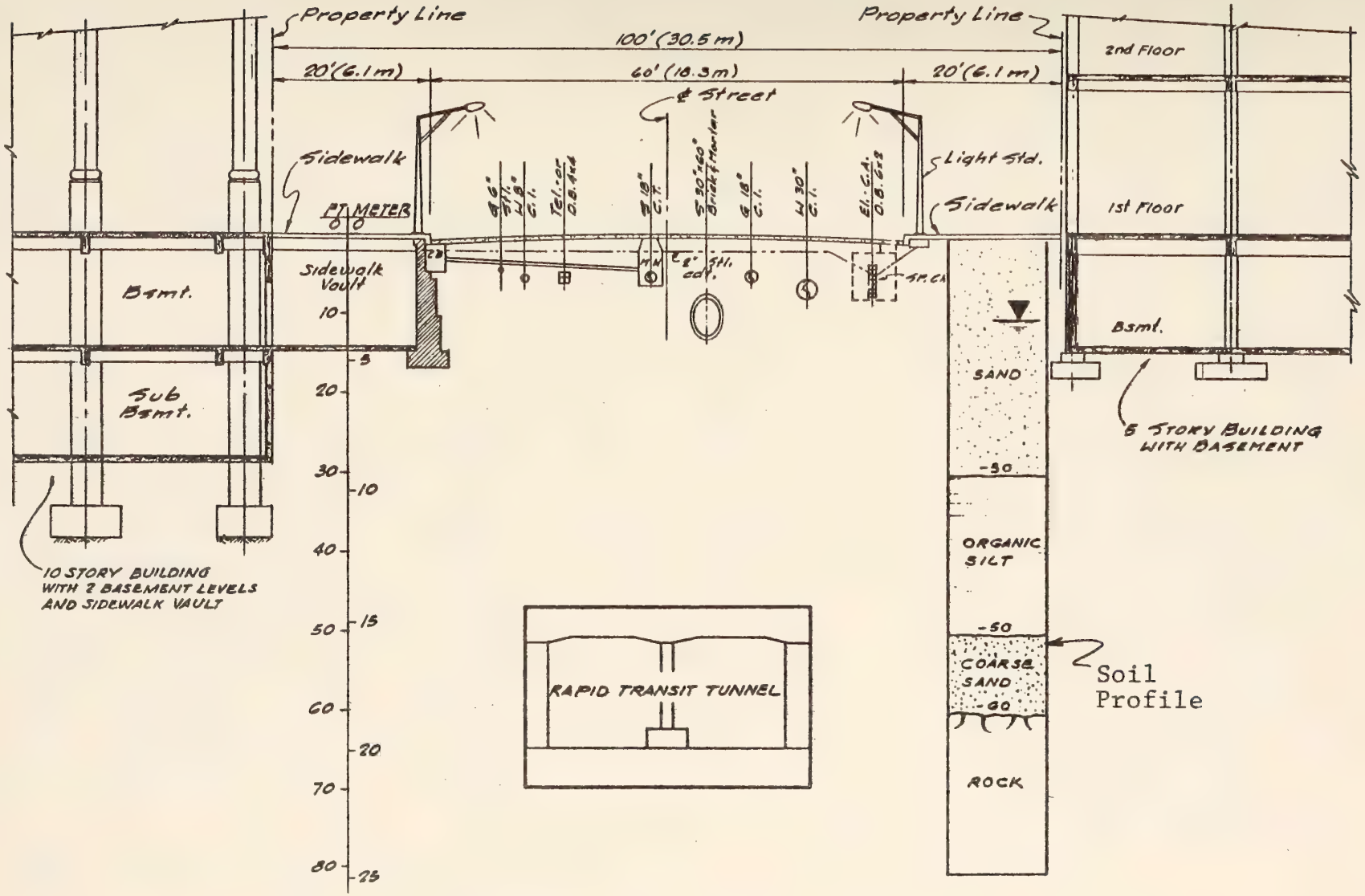


Figure 11. PROJECT 4-3LY - TRANSIT TUNNEL
SITE 4 - 70' DEPTH
PRECAST CONCRETE PANELS - INTERNAL BRACING

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	7129571	1979747	4504057	4244194	2191606	20049175	100.000
PROJECT						20049175	100.000

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

			TOTAL COST ANALYSIS			PROJECT SUMMARY				
			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3A00	1	CONST BARRICADES,ETC	37557	1037	25799			64393	.321	3A00 1
		40 DA	938.925	25.925	644.975			1609.825		
3A00	2	SET & MOVE BARRIC,ETC	19205	1812	3514			24531	.122	3A00 2
		30 DA	640.167	60.400	117.133			817.700		
3A00	3	FLAGMEN-DIRECT TRAFFIC	35586		2491			38077	.190	3A00 3
		230 DA	154.722		10.830			165.552		
3A00	ITEM	TRAFFIC CONTROL	92348	2849	31804			127001	.633	3A00 ITEM
3BD1	1	ALL OPERATIONS	153077	18146	131290		1465211	1767724	8.817	3BD1 1
3BD1	ITEM	UTILITY WORK-ALTERNATE	153077	18146	131290		1465211	1767724	8.817	3BD1 ITEM
3C00	1	GENL EXTERIOR PROTECT	21501	6955	7550			36006	.180	3C00 1
		40 DA	537.525	173.875	188.750			900.150		
3C00	ITEM	PROTECT ADJ STRUCTURES	21501	6955	7550			36006	.180	3C00 ITEM
3DDY	1	TRENCH & SUMP-EXCAV.	69485	14224	15364			99073	.494	3DDY 1
		140 DAY	496.321	101.600	109.743			707.664		
3DDY	2	CONSTR INVERT SUMPS	8130	1259	982			10371	.052	3DDY 2
		3 EA	2710.000	419.667	327.333			3457.000		
3DDY	3	PUMPING FROM SUMPS	134750	30308	9433			174491	.870	3DDY 3
		280 DAY	481.250	108.243	33.689			623.182		
3DDY	ITEM	CONTROL GROUNDWATER	212365	45791	25779			283935	1.416	3DDY ITEM

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3E00 6	PILE CAPS,WALES,DECKBM	117138	25663	710200			853001	4.255	3E00 6
	1404 TON	83.432	18.278	505.840			607.551		
3E00 7	LATERAL & SWAY BRACING	51436	9233	73601			134270	.670	3E00 7
	100 TON	514.360	92.330	736.010			1342.700		
3E00 8	DECK MATS & TIMBERS	37086	2739	375941			415766	2.074	3E00 8
	10667 SY	3.477	.257	35.243			38.977		
3E00 11	REMOVE TIMBER DECKING	23825	3680	1668			29173	.146	3E00 11
	10667 SY	2.234	.345	.156			2.735		
3E00 12	REMOVE DECK BEAMS	33826	14455	2368			50649	.253	3E00 12
	1084 TON	31.205	13.335	2.185			46.724		
3E00 13	REMOVE WALES & CAPS	23343	9975	1634			34952	.174	3E00 13
	330 TON	70.736	30.227	4.952			105.915		
3E00 14	REM.LAG.& PILES TO -6	31831	8611	2228			42670	.213	3E00 14
	4000 LF	7.958	2.153	.557			10.668		
3E00 ITEM	STREET DECKING	318485	74356	1167640			1560481	7.783	3E00 ITEM
	10667 SY	29.857	6.971	109.463			146.291		
3FCY 1	MOB.SLURRY PLT,EQUIP.	17083	30490	1196			48769	.243	3FCY 1
	30 DA	569.433	1016.333	39.867			1625.633		
3FCY 2	PRECAST YARD	232031	108540	16242	1607728	358240	2322781	11.585	3FCY 2
	140 DA	1657.364	775.286	116.014	11483.771	2558.857	16591.293		

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3FCY 3	TRENCH @ WALL LOCATION	88368	12400	77997			178765	.892	3FCY 3
	4000 LF	22.092	3.100	19.499			44.691		
3FCY 4	EXCV SLOT FOR PANELS	153992	196692	10779			361463	1.803	3FCY 4
	27556 CY	5.588	7.138	.391			13.117		
3FCY 5	DRILL FOR PILES-ROCK	136057	119612	24220			279889	1.396	3FCY 5
	1336 EA	101.839	89.530	18.129			209.498		
3FCY 6	SET PRE-CAST PANELS	216890	110194	32507			359591	1.794	3FCY 6
	668 EA	324.686	164.961	48.663			538.310		
3FCY 7	TREMIE PANEL BASE	58030	14189	109062			181281	.904	3FCY 7
	4000 LF	14.508	3.547	27.266			45.320		
3FCY 8	OPERATE SLURRY EQUIP.	261840	59136	405279			726255	3.622	3FCY 8
	200 DA	1309.200	295.680	2026.395			3631.275		
3FCY 9	DEMOBE.SLURRY EQUIP.	9927	2816	695			13438	.067	3FCY 9
	10 DA	992.700	281.600	69.500			1343.800		
3FCY 10	PLACE LAGGING 1ST.10FT	57770	5299	30444			93513	.466	3FCY 10
	40000 SF	1.444	.132	.761			2.338		
3FCY 11	CLN.PNL.& PATCH JT.	102169	22921	16098			141188	.704	3FCY 11
	260 DA	392.958	88.158	61.915			543.031		
3FCY 12	GROUT WALL-ROCK SEAL	24818	11783	66187			102788	.513	3FCY 12
	4000 LF	6.205	2.946	16.547			25.697		
3FCY 13	ROCK FACE STABILIZED	105940	13145	96467			215552	1.075	3FCY 13
	4444 SY	23.839	2.958	21.707			48.504		
3FCY ITEM	GROUND SUPPORT WALL	1464915	707217	887173	1607728	358240	5025273	25.065	3FCY ITEM
	26667 SY	54.934	26.520	33.269	60.289	13.434	188.445		

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3GEQ 1	SET BRACING LEVEL NO 2	54878	16009	325841			396728	1.979	3GEQ 1
	644 TON	85.214	24.859	505.964			616.037		
3GEQ 2	PRESTRESS LEVEL NO 2	12641	295	885			13821	.069	3GEQ 2
	644 TON	19.629	.458	1.374			21.461		
3GEQ 3	SET BRACING LEVEL NO 3	60844	17748	389759			468351	2.336	3GEQ 3
	771 TON	78.916	23.019	505.524			607.459		
3GEQ 4	PRESTRESS LEVEL NO 3	14014	327	981			15322	.076	3GEQ 4
	771 TON	18.176	.424	1.272			19.873		
3GEQ 5	DRILL & CASE EARTH-L4	44363	16762	44796			105921	.528	3GEQ 5
	21380 LF	2.075	.784	2.095			4.954		
3GEQ 6	DRILL ROCK & INST-L4	92640	50550	92099			235289	1.174	3GEQ 6
	18700 LF	4.954	2.703	4.925			12.582		
3GEQ 7	INSTALL WALES-LEVEL 4	61315	17275	35292			113882	.568	3GEQ 7
	125 TON	490.520	138.200	282.336			911.056		
3GEQ 11	REMOVE ANCHOR WALE	7489	2691	524			10704	.053	3GEQ 11
	125 TON	59.912	21.528	4.192			85.632		
3GEQ 12	REMOVE INTERN. BRACING	49076	20611	3435			73122	.365	3GEQ 12
	1415 TON	34.683	14.566	2.428			51.676		
3GEQ ITEM	INTERNAL BRACING	397260	142268	893612			1433140	7.148	3GEQ ITEM
	1540 TON	257.961	92.382	580.268			930.610		

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3HFQ 1	BREAK PAVEMENT & HAUL	20870	8686	1461			31017	.155	3HFQ 1
	8889 SY	2.348	.977	.164			3.489		
3HFQ 2	EXCAVATE FIRST 5 FT	79869	38583	5591			124043	.619	3HFQ 2
	14800 CY	5.397	2.607	.378			8.381		
3HFQ 3	SAND EXCAV 5 TO 22 FT	160273	120447	11219			291939	1.456	3HFQ 3
	50400 CY	3.180	2.390	.223			5.792		
3HFQ 4	SAND EXCAV 22 TO 30 FT	59250	72637	4148			136035	.679	3HFQ 4
	23700 CY	2.500	3.065	.175			5.740		
3HFQ 5	SILT EXCAV 30 TO 50 FT	169386	207662	100807			477855	2.383	3HFQ 5
	59300 CY	2.856	3.502	1.700			8.058		
3HFQ 6	SAND EXCAV 50 TO 60 FT	73985	90703	5179			169867	.847	3HFQ 6
	29600 CY	2.499	3.064	.175			5.739		
3HFQ 7	ROCK EXCAV 60 TO 70 FT	131184	127129	44598			302911	1.511	3HFQ 7
	26700 CY	4.913	4.761	1.670			11.345		
3HFQ 8	FINE GRADE INVERT	42988	19716	12759			75463	.376	3HFQ 8
	8000 SY	5.374	2.465	1.595			9.433		
3HFQ ITEM	EXCAVATION	737805	685563	185762			1609130	8.026	3HFQ ITEM
	204500 CY	3.608	3.352	.908			7.869		
3IBR 1	LEVELING SLAB FORMS	11966		3358			15324	.076	3IBR 1
	20 EA	598.300		167.900			766.200		

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3IBR 2	POUR LEVELING SLAB	27040	2762	1893	24930		56625	.282	3IBR 2
	840 CY	32.190	3.288	2.254	29.679		67.411		
3IBR 3	BASE SLAB REBAR	185224	13248	12966	449400		660838	3.296	3IBR 3
	1070 TON	173.107	12.381	12.118	420.000		617.606		
3IBR 4	BASE SLAB BULKHEADS	43079		6032			49111	.245	3IBR 4
	7200 SF	5.983		.838			6.821		
3IBR 5	BASE SLAB-POUR,CLEANUP	135204	13808	9464	402582		561058	2.798	3IBR 5
	13340 CY	10.135	1.035	.709	30.179		42.058		
3IBR 6	FORM CENTER WALKWAY	29916		4396			34312	.171	3IBR 6
	10000 SF	2.992		.440			3.431		
3IBR 7	POUR CENTER WALKWAY	24879	2541	1742	27835		56997	.284	3IBR 7
	920 CY	27.042	2.762	1.893	30.255		61.953		
3IBR 8	ASSEM STEEL WL&RF FORM	21406	1947	73258			96611	.482	3IBR 8
	20 DA	1070.300	97.350	3662.900			4830.550		
3IBR 10	WALL REBAR	82529	5114	5777	162120		255540	1.275	3IBR 10
	386 TON	213.806	13.249	14.966	420.000		662.021		
3IBR 11	MOVE & SET STEEL FORMS	197840		19791			217631	1.085	3IBR 11
	2000 LF	98.920		9.896			108.816		
3IBR 12	ROOF SLAB REBAR	213338	13219	14934	381360		622851	3.107	3IBR 12
	908 TON	234.954	14.558	16.447	420.000		685.959		
3IBR 13	POUR WALLS & ROOF SLAB	135204	13808	9464	520954		679430	3.389	3IBR 13
	17260 CY	7.833	.800	.548	30.183		39.364		

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3IBR 14	TRACK INVERT FILL CONC	35693	5077	3339	60944		105053	.524	3IBR 14
	1980 CY	18.027	2.564	1.686	30.780		53.057		
3IBR 15	ELECTRICAL EMBEDDED					150000	150000	.748	3IBR 15
3IBR 16	MECHANICAL EMBEDDED					70000	70000	.349	3IBR 16
3IBR 17	PATCH & POINT WLS & RF	35898		2513	1830		40241	.201	3IBR 17
	176000 SF	.204		.014	.010		.229		
3IBR 18	PLACE ROOF WATERPROOF					87012	87012	.434	3IBR 18
	8489 SY					10.250	10.250		
3IBR 19	MORTAR PROT.FOR W.P.	25707	462	2639	36531		65339	.326	3IBR 19
	940 CY	27.348	.491	2.807	38.863		69.510		
3IBR 20	CLEAN UP STRUCTURE	11829	662	828			13319	.066	3IBR 20
	20 DA	591.450	33.100	41.400			665.950		
3IBR ITEM	CONSTRUCT PERM STRUCT	1216752	72648	172394	2068486	307012	3837292	19.139	3IBR ITEM
	34340 CY	35.432	2.116	5.020	60.235	8.940	111.744		
3JEQ 1	BACKFILL & TAMP 2 FT	34574	1536	2420	23600		62130	.310	3JEQ 1
	5900 CY	5.860	.260	.410	4.000		10.531		
3JEQ 2	BACKFILL & TAMP 2-22FT	133792	16619	9365	237200		396976	1.980	3JEQ 2
	59300 CY	2.256	.280	.158	4.000		6.694		
3JEQ 3	BACKFILL & TMP 22-41FT	108884	13525	7622	225200		355231	1.772	3JEQ 3
	56300 CY	1.934	.240	.135	4.000		6.310		

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3JEQ 4	BACKFILL & TMP.TOP 5FT	100177	12444	7012	59200		178833	.892	3JEQ 4
	14800 CY	6.769	.841	.474	4.000		12.083		
3JEQ ITEM	BACKFILL	377427	44124	26419	545200		993170	4.954	3JEQ ITEM
	136300 CY	2.769	.324	.194	4.000		7.287		
3K00 1	PLACE 6IN SUBGRADE	11488	3163	804	13900		29355	.146	3K00 1
	11110 SY	1.034	.285	.072	1.251		2.642		
3K00 2	PLACE 4IN BASE COURSE	11488	3163	804	8880		24335	.121	3K00 2
	11110 SY	1.034	.285	.072	.799		2.190		
3K00 3	STREET PAVING					42343	42343	.211	3K00 3
	13350 SY					3.172	3.172		
3K00 ITEM	STREET RESTORATION	22976	6326	1608	22780	42343	96033	.479	3K00 ITEM
	13350 SY	1.721	.474	.120	1.706	3.172	7.193		
3N00 1	FIXED EXPENSES	67200	30000	218704			315904	1.576	3N00 1
3N00 ITEM	OVERHEAD-FIXED COSTS	67200	30000	218704			315904	1.576	3N00 ITEM
3OLQ 1	OVERHEAD LABOR	1058700		74109			1132809	5.650	3OLQ 1
	34 MO	31138.235		2179.676			33317.912		
3OLQ 2	OVERHEAD EXPENSES			368900			368900	1.840	3OLQ 2
	34 MO			10850.000			10850.000		

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3OLQ 3	GENERAL SERVICE CREW	906000	77004	63420			1046424	5.219	3OLQ 3
	600 DA	1510.000	128.340	105.700			1744.040		
3OLQ 4	VEHICLE OPERATION		34000				34000	.170	3OLQ 4
	34 MO		1000.000				1000.000		
3OLQ ITEM	OVERHEAD-TIME RELATED	1964700	111004	506429			2582133	12.879	3OLQ ITEM
	34 MO	57785.294	3264.824	14894.971			75945.088		
3P00 1	FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	1.029	3P00 1
3P00 ITEM	PLANT-FIXED COSTS	82760	25000	79793		18800	206353	1.029	3P00 ITEM
3QLQ 1	TIME RELATED COSTS		7500	168100			175600	.876	3QLQ 1
	34 MO		220.588	4944.118			5164.706		
3QLQ ITEM	PLANT-TIME RELATED		7500	168100			175600	.876	3QLQ ITEM
	34 MO		220.588	4944.118			5164.706		

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	7129571	1979747	4504057	4244194	2191606	20049175	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 1-3HY

RAPID TRANSIT LINE SECTION
SITE 1 - 70' DEPTH
SOLDIER PILE & LAGGING GROUND SUPPORT
TIEBACK BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

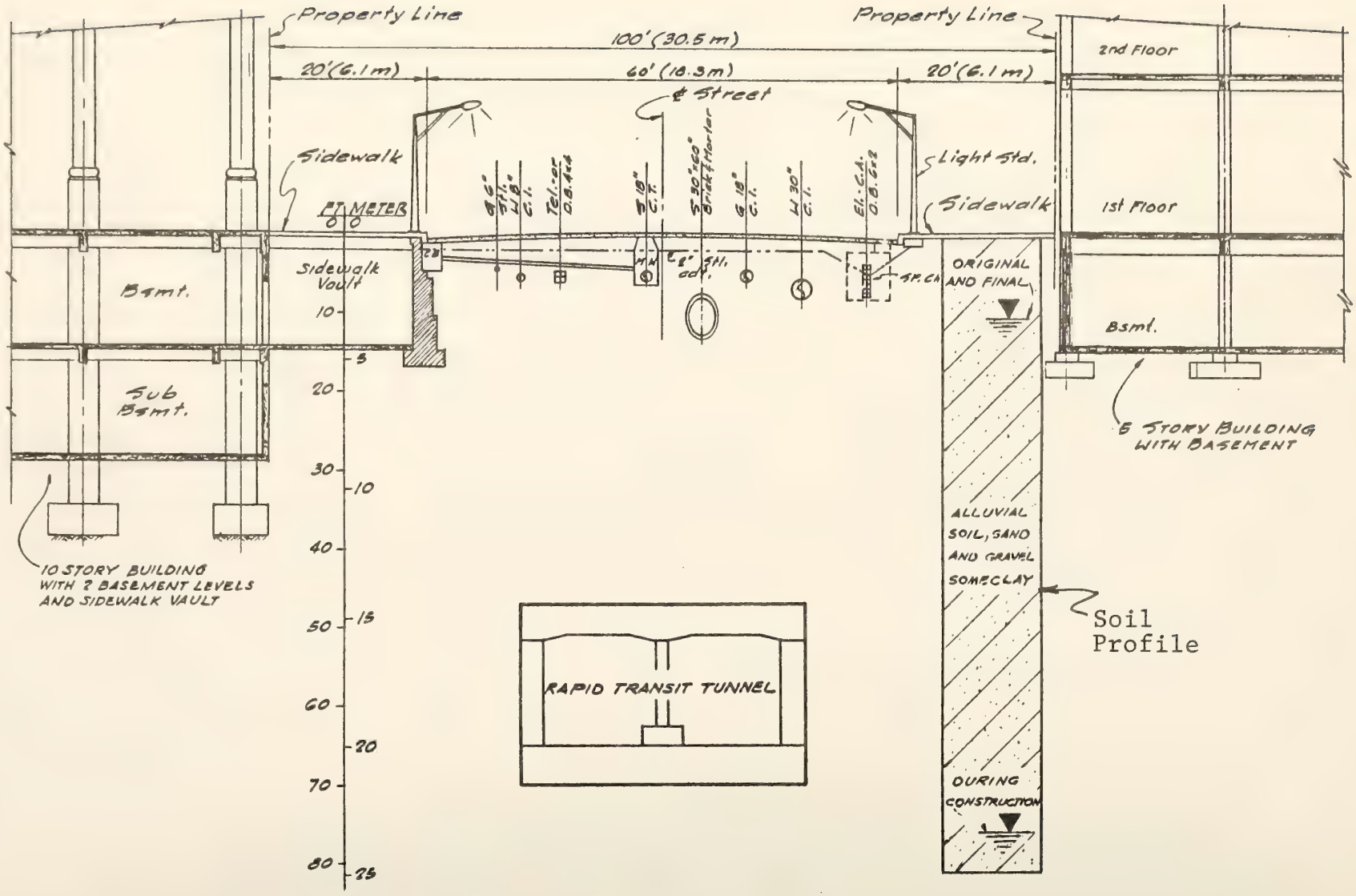


Figure 12. PROJECT 1-3HY - TRANSIT TUNNEL
SITE 1 - 70' DEPTH
SOLDIER PILES & LAGGING - TIEBACK BRACING

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT DOT 1-3HY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6107246	1524347	4372147	2653333	2301035	16958108	100.000
PROJECT						16958108	100.000

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT DOT 1-3HY

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3A00	1	CONST BARRICADES,ETC	37557	1037	25799			64393	.380	3A00 1
		40 DA	938.925	25.925	644.975			1609.825		
3A00	2	SET & MOVE BARRIC,ETC	19205	1812	3514			24531	.145	3A00 2
		30 DA	640.167	60.400	117.133			817.700		
3A00	3	FLAGMEN-DIRECT TRAFFIC	30944		2166			33110	.195	3A00 3
		200 DA	154.720		10.830			165.550		
3A00	ITEM	TRAFFIC CONTROL	87706	2849	31479			122034	.720	3A00 ITEM
3BA1	1	ALL OPERATIONS	153077	18146	131290		964543	1267056	7.472	3BA1 1
3BA1	ITEM	UTILITY WORK-ALTERNATE	153077	18146	131290		964543	1267056	7.472	3BA1 ITEM
3C00	1	GENL EXTERIOR PROTECT	21501	6955	7550			36006	.212	3C00 1
		40 DA	537.525	173.875	188.750			900.150		
3C00	ITEM	PROTECT ADJ STRUCTURES	21501	6955	7550			36006	.212	3C00 ITEM
3DA7	1	ALL OPERATIONS					973349	973349	5.740	3DA7 1
3DA7	ITEM	CONTROL GRNDWTR-ALT					973349	973349	5.740	3DA7 ITEM
3E00	6	PILE CAPS,WALES,DECKBM	117721	25790	672240			815751	4.810	3E00 6
		1328 TON	88.645	19.420	506.205			614.270		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT DOT 1-3HY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3E00 7	LATERAL & SWAY BRACING	51436	9233	73601			134270	.792	3E00 7
	100 TON	514.360	92.330	736.010			1342.700		
3E00 8	DECK MATS & TIMBERS	37374	2760	329271			369405	2.178	3E00 8
	9333 SY	4.005	.296	35.280			39.581		
3E00 11	REMOVE TIMBER DECKING	20844	3220	1459			25523	.151	3E00 11
	9333 SY	2.233	.345	.156			2.735		
3E00 12	REMOVE DECK BEAMS	29984	12814	2099			44897	.265	3E00 12
	961 TON	31.201	13.334	2.184			46.719		
3E00 13	REMOVE WALES & CAPS	33030	14115	2312			49457	.292	3E00 13
	467 TON	70.728	30.225	4.951			105.904		
3E00 14	REM.LAG.& PILES TO -6	31831	8611	2228			42670	.252	3E00 14
	4000 LF	7.958	2.153	.557			10.668		
3E00 ITEM	STREET DECKING	322220	76543	1083210			1481973	8.739	3E00 ITEM
	9333 SY	34.525	8.201	116.062			158.788		
3FAQ 1	TRENCH FOR SOLD PILES	88368	12400	10586			111354	.657	3FAQ 1
	4000 LF	22.092	3.100	2.647			27.839		
3FAQ 2	DRILL HOLES FOR PILES	101218	119878	24060			245156	1.446	3FAQ 2
	48500 LF	2.087	2.472	.496			5.055		
3FAQ 3	SPLICE,PLACE,TRIM PILE	101382	37365	606157			744904	4.393	3FAQ 3
	500 EA	202.764	74.730	1212.314			1489.808		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT DOT 1-3HY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3FAQ 4	BACKFILL PILE HOLES	32981	8273	81525			122779	.724	3FAQ 4
	500 EA	65.962	16.546	163.050			245.558		
3FAQ 5	PLACE LAGGING	336999	30913	252390			620302	3.658	3FAQ 5
	280000 SF	1.204	.110	.901			2.215		
3FAQ ITEM	GROUND SUPPORT WALL	660948	208829	974718			1844495	10.877	3FAQ ITEM
	31111 SY	21.245	6.712	31.330			59.288		
3GFQ 1	MOBILIZE & DEMOBILIZE	4098	2878	287			7263	.043	3GFQ 1
	10 DA	409.800	287.800	28.700			726.300		
3GFQ 2	INST. TIEBACK-LEVEL 2	307301	159953	248271			715525	4.219	3GFQ 2
	77000 LF	3.991	2.077	3.224			9.293		
3GFQ 3	INSTALL WALE-LEVEL 2	89530	25224	53927			168681	.995	3GFQ 3
	188 TON	476.223	134.170	286.846			897.239		
3GFQ 4	INST. TIEBACK-LEVEL 3	127709	66473	199365			393547	2.321	3GFQ 4
	64000 LF	1.995	1.039	3.115			6.149		
3GFQ 5	INSTALL WALE-LEVEL 3	89530	25224	53927			168681	.995	3GFQ 5
	188 TON	476.223	134.170	286.846			897.239		
3GFQ 6	INST. TIEBACK-LEVEL 4	107755	56088	169828			333671	1.968	3GFQ 6
	54000 LF	1.995	1.039	3.145			6.179		
3GFQ 7	INSTALL WALE-LEVEL 4	89862	25318	64370			179550	1.059	3GFQ 7
	229 TON	392.410	110.559	281.092			784.061		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT DOT 1-3HY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3GFQ 8	INST. TIEBACK-LEVEL 5	71837	37392	116939			226168	1.334	3GFQ 8
	36000 LF	1.995	1.039	3.248			6.282		
3GFQ 9	INSTALL WALE-LEVEL 5	86332	24323	50363			161018	.950	3GFQ 9
	176 TON	490.523	138.199	286.153			914.875		
3GFQ 10	INST. TIEBACK-LEVEL 6	32925	17138	54030			104093	.614	3GFQ 10
	16500 LF	1.995	1.039	3.275			6.309		
3GFQ 11	INSTALL WALE-LEVEL 6	51800	14594	37566			103960	.613	3GFQ 11
	132 TON	392.424	110.561	284.591			787.576		
3GFQ 14	REMOVE WALE STEEL	54699	19655	3829			78183	.461	3GFQ 14
	913 TON	59.911	21.528	4.194			85.633		
3GFQ ITEM	BRACING - TIEBACK	1113378	474260	1052702			2640340	15.570	3GFQ ITEM
	247500 LF	4.498	1.916	4.253			10.668		
3HFQ 1	BREAK PAVEMENT & HAUL	18784	7817	1315			27916	.165	3HFQ 1
	8000 SY	2.348	.977	.164			3.490		
3HFQ 2	EXCAVATE FIRST 5 FT	71779	34675	5025			111479	.657	3HFQ 2
	13300 CY	5.397	2.607	.378			8.382		
3HFQ 3	EXCAVATE 5 TO 22 FT	115243	86606	8067			209916	1.238	3HFQ 3
	45300 CY	2.544	1.912	.178			4.634		
3HFQ 4	EXCAVATE 22 TO 70 FT	226828	288184	15878			530890	3.131	3HFQ 4
	127900 CY	1.773	2.253	.124			4.151		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT DOT 1-3HY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3HFQ 5	FINE GRADE INVERT	34391	15773	2407			52571	.310	3HFQ 5
	8000 SY	4.299	1.972	.301			6.571		
3HFQ ITEM	EXCAVATION	467025	433055	32692			932772	5.500	3HFQ ITEM
	186500 CY	2.504	2.322	.175			5.001		
3IAR 1	LEVELING SLAB FORMS	11966		3358			15324	.090	3IAR 1
	20 EA	598.300		167.900			766.200		
3IAR 2	POUR LEVELING SLAB	26134	2669	1829	25623		56255	.332	3IAR 2
	860 CY	30.388	3.103	2.127	29.794		65.413		
3IAR 3	BASE SLAB REBAR	185224	13248	12966	449400		660838	3.897	3IAR 3
	1070 TON	173.107	12.381	12.118	420.000		617.606		
3IAR 4	BASE SLAB BULKHEADS	43079		5831			48910	.288	3IAR 4
	7200 SF	5.983		.810			6.793		
3IAR 5	BASE SLAB-POUR,CLEANUP	135109	13798	9458	402875		561240	3.310	3IAR 5
	13340 CY	10.128	1.034	.709	30.201		42.072		
3IAR 6	FORM CENTER WALKWAY	29916		4396			34312	.202	3IAR 6
	10000 SF	2.992		.440			3.431		
3IAR 7	POUR CENTER WALKWAY	24879	2541	1742	27835		56997	.336	3IAR 7
	920 CY	27.042	2.762	1.893	30.255		61.953		
3IAR 8	ASSEM STEEL WL&RF FORM	21406	1947	75948			99301	.586	3IAR 8
	20 DA	1070.300	97.350	3797.400			4965.050		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT DOT 1-3HY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3IAR 9	PLACE OUTER WALL W.P.	14754		1033	30360		46147	.272	3IAR 9
	10200 SY	1.446		.101	2.976		4.524		
3IAR 10	WALL REBAR	103869	6436	7271	216300		333876	1.969	3IAR 10
	515 TON	201.687	12.497	14.118	420.000		648.303		
3IAR 11	MOVE & SET STEEL FORMS	197840		19791			217631	1.283	3IAR 11
	2000 LF	98.920		9.896			108.816		
3IAR 12	ROOF SLAB REBAR	214578	13296	15020	349020		591914	3.490	3IAR 12
	831 TON	258.217	16.000	18.075	420.000		712.291		
3IAR 13	POUR WALLS & ROOF SLAB	67561	6900	4729	541464		620654	3.660	3IAR 13
	17940 CY	3.766	.385	.264	30.182		34.596		
3IAR 14	TRACK INVERT FILL CONC	35693	5077	3339	60944		105053	.619	3IAR 14
	1980 CY	18.027	2.564	1.686	30.780		53.057		
3IAR 15	ELECTRICAL EMBEDDED					150000	150000	.885	3IAR 15
3IAR 16	MECHANICAL EMBEDDED					70000	70000	.413	3IAR 16
3IAR 17	PATCH & POINT WLS & RF	32633		2284	1830		36747	.217	3IAR 17
	160000 SF	.204		.014	.011		.230		
3IAR 18	PLACE ROOF WATERPROOF					82000	82000	.484	3IAR 18
	8000 SY					10.250	10.250		
3IAR 19	MORTAR PROT.FOR W.P.	24845	446	2579	34502		62372	.368	3IAR 19
	860 CY	28.890	.519	2.999	40.119		72.526		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT DOT 1-3HY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3IAR 20	CLEAN UP STRUCTURE	11829	662	828			13319	.079	3IAR 20
	20 DA	591.450	33.100	41.400			665.950		
3IAR 31	REBRACE ABOVE ROOFLINE	88261	25746	35178			149185	.880	3IAR 31
	406 TON	217.392	63.414	86.645			367.451		
3IAR 32	PRESTRESS REBRACE	20331	474	1423			22228	.131	3IAR 32
	406 TON	50.076	1.167	3.505			54.749		
3IAR 33	REMOVE REBRACE STEEL	21546	9049	1508			32103	.189	3IAR 33
	406 TON	53.069	22.288	3.714			79.071		
3IAR ITEM	CONSTRUCT PERM STRUCT	1311453	102289	210511	2140153	302000	4066406	23.979	3IAR ITEM
	35040 CY	37.427	2.919	6.008	61.077	8.619	116.050		
3JFQ 1	BACKFILL & TAMP 2 FT	31057	1380	2174	21200		55811	.329	3JFQ 1
	5300 CY	5.860	.260	.410	4.000		10.530		
3JFQ 2	BACKFILL & TMP 2-34 FT	92519	31929	6476	416000		546924	3.225	3JFQ 2
	104000 CY	.890	.307	.062	4.000		5.259		
3JFQ 3	BACKFILL & TMP.TOP 5FT	90025	11183	6302	53200		160710	.948	3JFQ 3
	13300 CY	6.769	.841	.474	4.000		12.083		
3JFQ ITEM	BACKFILL	213601	44492	14952	490400		763445	4.502	3JFQ ITEM
	122600 CY	1.742	.363	.122	4.000		6.227		
3K00 1	PLACE 6IN SUBGRADE	11488	3163	804	13900		29355	.173	3K00 1
	11110 SY	1.034	.285	.072	1.251		2.642		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT DOT 1-3HY

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3K00	2	PLACE 4IN BASE COURSE	11488	3163	804	8880		24335	.144	3K00 2
		11110 SY	1.034	.285	.072	.799		2.190		
3K00	3	STREET PAVING					42343	42343	.250	3K00 3
		13350 SY					3.172	3.172		
3K00	ITEM	STREET RESTORATION	22976	6326	1608	22780	42343	96033	566	3K00 ITEM
		13350 SY	1.721	.474	.120	1.706	3.172	7.193		
3N00	1	FIXED EXPENSES	67200	30000	200704			297904	1.757	3N00 1
3N00	ITEM	OVERHEAD-FIXED COSTS	67200	30000	200704			297904	1.757	3N00 ITEM
3OHQ	1	OVERHEAD LABOR	858600		60102			918702	5.417	3OHQ 1
		28 MO	30664.286		2146.500			32810.786		
3OHQ	2	OVERHEAD EXPENSES			303800			303800	1.791	3OHQ 2
		28 MO			10850.000			10850.000		
3OHQ	3	GENERAL SERVICE CREW	724801	61603	50736			837140	4.937	3OHQ 3
		480 DA	1510.002	128.340	105.700			1744.042		
3OHQ	4	VEHICLE OPERATION		28000				28000	.165	3OHQ 4
		28 MO		1000.000				1000.000		
3OHQ	ITEM	OVERHEAD-TIME RELATED	1583401	89603	414638			2087642	12.311	3OHQ ITEM
		28 MO	56550.036	3200.107	14808.500			74558.643		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-76 FOOT DOT 1-3HY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3P00 1	FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	1.217	3P00 1
3P00 ITEM	PLANT-FIXED COSTS	82760	25000	79793		18800	206353	1.217	3P00 ITEM
3QHQ 1	TIME RELATED COSTS		6000	136300			142300	.839	3QHQ 1
	28 MO		214.286	4867.857			5082.143		
3QHQ ITEM	PLANT-TIME RELATED		6000	136300			142300	.839	3QHQ ITEM
	28 MO		214.286	4867.857			5082.143		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT DOT 1-3HY

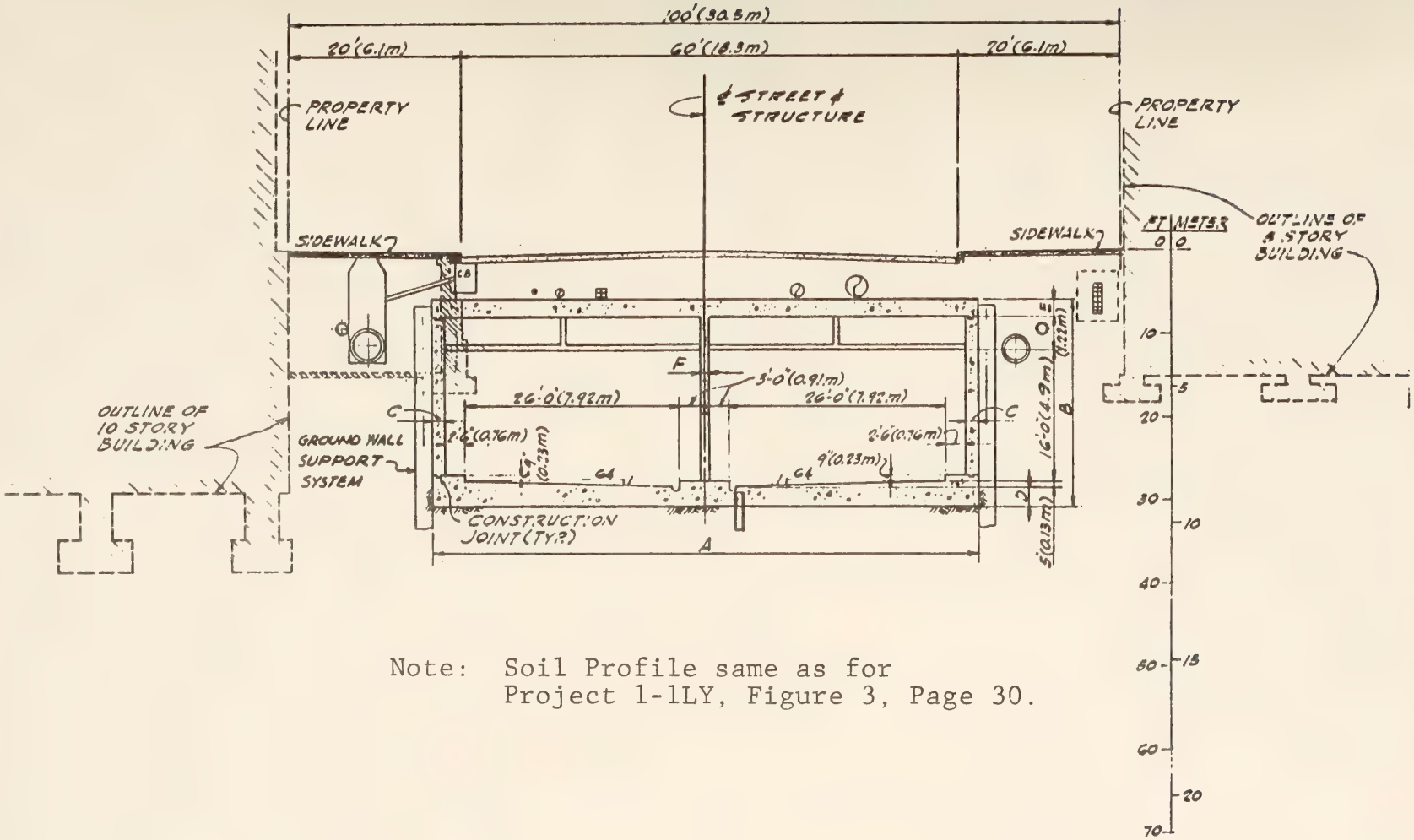
TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6107246	1524347	4372147	2653333	2301035	16958108	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 1-1LT

CUT-AND-COVER METHOD
FOUR LANE HIGHWAY TUNNEL
SITE 1 - 30' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
INTERNAL BRACING

This is one of three estimates produced by computer extension for this study, to test the methods and results of the series of 176 estimates forming the basis of the study effort. Based on this series of estimates, a highway tunnel, at minimum depth, with precast concrete panel walls was chosen to test innovative basic construction methods. Traditional cut-and-cover construction (1-1LT), inverted construction (1-4LT) and combination (or partially inverted) construction (1-7LT) are compared under the same site and structure conditions. The relation of estimate 1-1LT in the series of 176 estimates is shown graphically in Table 1.



Note: Soil Profile same as for Project 1-1LY, Figure 3, Page 30.

Figure 13. PROJECT 1-1LT - CUT-AND-COVER CONSTRUCTION HIGHWAY TUNNEL - SITE 1 - 30' DEPTH PRECAST CONCRETE PANELS - INTERNAL BRACING

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6457740	1234673	3871507	3492526	2927691	17984137	100.000
PROJECT						17984137	100.000

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1A00 1	CONST.BARRICADES ETC.	42253	1166	37713			81132	.451	1A00 1
	45 DA	938.956	25.911	838.067			1802.933		
1A00 2	SET&MOVE BARRICADES ET	28807	2718	5271			36796	.205	1A00 2
	45 DA	640.156	60.400	117.133			817.689		
1A00 3	FLAGMEN-DIRECT TRAFFIC	37133		2599			39732	.221	1A00 3
	240 DA	154.721		10.829			165.550		
1A00 ITEM	CONTROL TRAFFIC	108193	3884	45583			157660	.877	1A00 ITEM
1BD0 21	UTILITY SUPPORT LONG.	89387	11040	88139			188566	1.049	1BD0 21
	2000 LF	44.694	5.520	44.070			94.283		
1BD0 22	UTILITY SUPPORT INTER.	41209	2120	32429			75758	.421	1BD0 22
	4 EA	10302.250	530.000	8107.250			18939.500		
1BD0 23	STORM DR&SEW.TEMP.LONG	44693	5520	39129			89342	.497	1BD0 23
	4000 LF	11.173	1.380	9.782			22.336		
1BD0 24	STORM DR&SEW.PERM.LONG					180000	180000	1.001	1BD0 24
	4000 LF					45.000	45.000		
1BD0 26	SEWER PERM. LONGIT.					49200	49200	.274	1BD0 26
	4000 LF					12.300	12.300		
1BD0 28	SEW. 18IN PERM. INTER.					7380	7380	.041	1BD0 28
	4 EA					1845.000	1845.000		
1BD0 30	STM.DR.LATER.PERM.LONG					2400	2400	.013	1BD0 30
	8 EA					300.000	300.000		

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1BD0 32	STM.DR.LATER.PERM.INT.					2400	2400	.013	1BD0 32
	8 EA					300.000	300.000		
1BD0 33	BLDG.SEW.LATERALS PERM					3667	3667	.020	1BD0 33
	55 EA					66.673	66.673		
1BD0 35	MANHOLES SEW.PERM.LONG					9200	9200	.051	1BD0 35
	8 EA					1150.000	1150.000		
1BD0 37	MANHOLES SEW.PERM.INT.					4600	4600	.026	1BD0 37
	4 EA					1150.000	1150.000		
1BD0 38	CATCH BASINS LONGIT.					7600	7600	.042	1BD0 38
	8 EA					950.000	950.000		
1BD0 39	CATCH BASINS INTER.					7600	7600	.042	1BD0 39
	8 EA					950.000	950.000		
1BD0 40	DIVERT 18IN SEWER INT.					55904	55904	.311	1BD0 40
	4 EA					13976.000	13976.000		
1BD0 41	WAT.MAIN 30IN CI LONG.					200000	200000	1.112	1BD0 41
	2000 LF					100.000	100.000		
1BD0 42	WATER 8IN LONGITUDINAL					70300	70300	.391	1BD0 42
	2000 LF					35.150	35.150		
1BD0 43	WATER 8IN INTERSECTION					23817	23817	.132	1BD0 43
	4 EA					5954.250	5954.250		
1BD0 44	RELOCATE FIRE HYD.LCNG					10000	10000	.056	1BD0 44
	4 EA					2500.000	2500.000		

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1BD0 45	RELOCATE FIRE HYD.INT.					20000	20000	.111	1BD0 45
	8 EA					2500.000	2500.000		
1BD0 46	DIVERT 8IN WATER INTER					6212	6212	.035	1BD0 46
	4 EA					1553.000	1553.000		
1BD0 51	GAS MAIN TEMP.LONG.					150000	150000	.834	1BD0 51
	2000 LF					75.000	75.000		
1BD0 52	GAS MAIN.PERM.LONG.					90000	90000	.500	1BD0 52
	2000 LF					45.000	45.000		
1BD0 53	GAS LINE 6IN.INTERSECT					8145	8145	.045	1BD0 53
	4 EA					2036.250	2036.250		
1BD0 54	GAS LINE 6IN TEMP.LONG					114300	114300	.636	1BD0 54
	2000 LF					57.150	57.150		
1BD0 55	GAS LINE 6IN LONGITUD.					54300	54300	.302	1BD0 55
	2000 LF					27.150	27.150		
1BD0 56	DIVERT 6IN GAS INTER.					26840	26840	.149	1BD0 56
	4 EA					6710.000	6710.000		
1BD0 61	TELEPH.4X4 DUCT LONGIT					58500	58500	.325	1BD0 61
	2000 LF					29.250	29.250		
1BD0 62	TELEPH.4X4 DUCT INTER.					8775	8775	.049	1BD0 62
	4 EA					2193.750	2193.750		
1BD0 63	TELEPHONE MANHOLE LONG					39960	39960	.222	1BD0 63
	4 EA					9990.000	9990.000		

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1BD0 64	TELEPHONE MANHOLE INT.					39960	39960	.222	1BD0 64
	4 EA					9990.000	9990.000		
1BD0 65	DIVERT TEL.DUCT INTER.					171212	171212	.952	1BD0 65
	4 EA					42803.000	42803.000		
1BD0 71	ELECT DUCT BK.2X6 LONG			33175			33175	.184	1BD0 71
	2000 LF			16.588			16.588		
1BD0 72	ELECT.DUCT 2X6 INTER.			4977			4977	.028	1BD0 72
	4 EA			1244.250			1244.250		
1BD0 73	ST.LT&TR.SIG.COND.INT.					19000	19000	.106	1BD0 73
	4 EA					4750.000	4750.000		
1BD0 74	STREET LIGHT TEMP.LONG	1596		112			1708	.009	1BD0 74
	24 EA	66.500		4.667			71.167		
1BD0 75	STREET LIGHT PERM.LONG	1596		112		5040	6748	.038	1BD0 75
	24 EA	66.500		4.667		210.000	281.167		
1BD0 76	TR.SIG.CONTRL.TEMP INT				8000		8000	.044	1BD0 76
	4 EA				2000.000		2000.000		
1BD0 77	TR.SIG.CONTRL.PERM INT					600	600	.003	1BD0 77
	4 EA					150.000	150.000		
1BD0 78	PED.&TRAFFIC SIG.PERM.					4800	4800	.027	1BD0 78
	4 EA					1200.000	1200.000		
1BD0 79	DIVERT ELECT DUCT INT.					103000	103000	.573	1BD0 79
	4 EA					25750.000	25750.000		

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1BD0 80	DIVERT BLDG.LATER LONG					165000	165000	.917	1BD0 80
	55 EA					3000.000	3000.000		
1BD0 81	REMOVE UTILITIES SUPP.	19670		1377			21047	.117	1BD0 81
	2000 LF	9.835		.689			10.524		
1BD0 ITEM	UTILITY WORK	198151	18680	199450	8000	1719712	2143993	11.922	1BD0 ITEM
1CD0 1	GENL EXTERIOR PROTECT	21501	6955	7550			36006	.200	1CD0 1
	40 DA	537.525	173.875	188.750			900.150		
1CD0 2	SIDEWALK VAULTS &WALLS	94179	18024	21703	22979		156885	.872	1CD0 2
	1000 LF	94.179	18.024	21.703	22.979		156.885		
1CD0 ITEM	PROTECT ADJ STRUCTURES	115680	24979	29253	22979		192891	1.073	1CD0 ITEM
1DDT 1	FURNISH,INSTALL&REMOVE					260634	260634	1.449	1DDT 1
1DDT 2	MAINT SYST-FIRST 6 MOS					149632	149632	.832	1DDT 2
	6 MO					24938.667	24938.667		
1DDT 3	MAINT SYST-AFTER 6 MOS					128810	128810	.716	1DDT 3
	5 MO					25762.000	25762.000		
1DDT ITEM	CONTROL GROUND WATER					539076	539076	2.998	1DDT ITEM
1E00 1	CENTER PILE EXPL HOLE	14847	2083	4339			21269	.118	1E00 1
	168 EA	88.375	12.399	25.827			126.601		

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1E00 2	DRILL HOLES-CENTR PILE	37399	44294	2618			84311	.469	1E00 2
	168 EA	222.613	263.655	15.583			501.851		
1E00 3	OPERATE SLURRY EQUIP	24439	5520	4774			34733	.193	1E00 3
	56 SH	436.411	98.571	85.250			620.232		
1E00 4	SPLICE,PLACE,TRIM,PILE	34065	12555	82025			128645	.715	1E00 4
	168 EA	202.768	74.732	488.244			765.744		
1E00 5	BACKFILL PILE HOLES	14776	3706	14653			33135	.184	1E00 5
	168 EA	87.952	22.060	87.220			197.232		
1E00 6	PILE CAPS,WALES,DECKBM	237227	51971	949106			1238304	6.886	1E00 6
	1865 TON	127.199	27.866	508.904			663.970		
1E00 7	LATERAL & SWAY BRACING	77158	13850	110401			201409	1.120	1E00 7
	150 TON	514.387	92.333	736.007			1342.727		
1E00 8	DECK MATS & TIMBERS	74747	5520	541887			622154	3.459	1E00 8
	15333 SY	4.875	.360	35.341			40.576		
1E00 9	REPOST DECK SUPPORT	81144	25140	18280			124564	.693	1E00 9
	168 EA	483.000	149.643	108.810			741.452		
1E00 11	REMOVE TIMBER DECKING	34974	5403	2448			42825	.238	1E00 11
	15333 SY	2.281	.352	.160			2.793		
1E00 12	RMV.DECK BMS.&INT.PILE	82189	35123	5753			123065	.684	1E00 12
	1859 TON	44.211	18.893	3.095			66.200		
1E00 13	REMOVE WALES & CAPS	31832	13603	2228			47663	.265	1E00 13
	450 TON	70.738	30.229	4.951			105.918		

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1E00 14	REM.LAG.&PILES TO -6	31831	8611	2228			42670	.237	1E00 14
	4000 LF	7.958	2.153	.557			10.668		
1E00 ITEM	STREET DECKING	776628	227379	1740740			2744747	15.262	1E00 ITEM
	15333 SY	50.651	14.829	113.529			179.009		
1FCT 1	MOB.SLURRY PLT,EQUIP.	17083	30490	1196			48769	.271	1FCT 1
	30 DA	569.433	1016.333	39.867			1625.633		
1FCT 2	PRECAST YARD	74580	34887	5221	732552	129260	976500	5.430	1FCT 2
	45 DA	1657.333	775.267	116.022	16278.933	2872.444	21700.000		
1FCT 3	TRENCH @ WALL LOCATION	88368	12400	77997			178765	.994	1FCT 3
	4000 LF	22.092	3.100	19.499			44.691		
1FCT 4	EXCV SLOT FOR PANELS	71055	90758	4974			166787	.927	1FCT 4
	11852 CY	5.995	7.658	.420			14.072		
1FCT 5	SET PRE-CAST PANELS	108439	55095	24916			188450	1.048	1FCT 5
	334 EA	324.668	164.955	74.599			564.222		
1FCT 6	OPERATE SLURRY EQUIP.	183288	41395	227140			451823	2.512	1FCT 6
	140 DA	1309.200	295.679	1622.429			3227.307		
1FCT 7	DEMOBE.SLURRY EQUIP.	9927	2816	695			13438	.075	1FCT 7
	10 DA	992.700	281.600	69.500			1343.800		
1FCT 8	PLACE LAGGING 1ST.10FT	57770	5299	30444			93513	.520	1FCT 8
	40000 SF	1.444	.132	.761			2.338		

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1FCT 9	CLN.PNL.& PATCH JT.	55015	12343	12797			80155	.446	1FCT 9
	140 DA	392.964	88.164	91.407			572.536		
1FCT ITEM	GROUND SUPPORT WALL	665525	285483	385380	732552	129260	2198200	12.223	1FCT ITEM
	13333 SY	49.916	21.412	28.904	54.943	9.695	164.869		
1GEN 1	SET BRACING LEVEL NO 2	98787	28816	268915			396518	2.205	1GEN 1
	524 TON	188.525	54.992	513.197			756.714		
1GEN 2	PRESTRESS LEVEL NO 2	22754	530	1593			24877	.138	1GEN 2
	524 TON	43.424	1.011	3.040			47.475		
1GEN 14	REMOVE BRACING LEVEL 2	38662	16237	2706			57605	.320	1GEN 14
	524 TON	73.782	30.987	5.164			109.933		
1GEN ITEM	INTERNAL BRACING	160203	45583	273214			479000	2.663	1GEN ITEM
	524 TON	305.731	86.990	521.401			914.122		
1HEN 1	BREAK PAVEMENT & HAUL	32871	13680	2301			48852	.272	1HEN 1
	14000 SY	2.348	.977	.164			3.489		
1HEN 2	EXCAVATE FIRST 5 FT	125744	60745	8802			195291	1.086	1HEN 2
	23300 CY	5.397	2.607	.378			8.382		
1HEN 3	EXCAVATE 5 TO 22 FT	201739	151609	14122			367470	2.043	1HEN 3
	79300 CY	2.544	1.912	.178			4.634		
1HEN 4	EXCAVATE 22 TO 30 FT	91770	98949	6424			197143	1.096	1HEN 4
	37300 CY	2.460	2.653	.172			5.285		

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1HEN 7	FINE GRADE INVERT	60183	27603	4213			91999	.512	1HEN 7
	14000 SY	4.299	1.972	.301			6.571		
1HEN ITEM	EXCAVATION	512307	352586	35862			900755	5.009	1HEN ITEM
	139900 CY	3.662	2.520	.256			6.439		
1ICR 1	LEVELING SLAB FORMS	11966		3988			15954	.089	1ICR 1
	20 EA	598.300		199.400			797.700		
1ICR 2	POUR LEVELING SLAB	27040	2762	1893	45982		77677	.432	1ICR 2
	1540 CY	17.558	1.794	1.229	29.858		50.440		
1ICR 3	BASE SLAB REBAR,	331847	23735	23229	808920		1187731	6.604	1ICR 3
	1926 TON	172.299	12.323	12.061	420.000		616.683		
1ICR 4	BASE SLAB BLKHDS&WK.FM	111766		12599			124365	.692	1ICR 4
	18680 SF	5.983		.674			6.658		
1ICR 5	BASE SLAB-POUR,CLEANUP	135204	13808	9464	782310		940786	5.231	1ICR 5
	25680 CY	5.265	.538	.369	30.464		36.635		
1ICR 9	ASSEM.STL.WL&RF&PL FRM	16055	1460	137124			154639	.860	1ICR 9
	15 DA	1070.333	97.333	9141.600			10309.267		
1ICR 11	WALL REBAR	39106	2423	2737	53760		98026	.545	1ICR 11
	128 TON	305.516	18.930	21.383	420.000		765.828		
1ICR 12	MOVE & SET STEEL FORMS	423539		42198			465737	2.590	1ICR 12
	2000 LF	211.770		21.099			232.869		

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1ICR 13	ROOF SLAB REBAR	171282	10613	11990	302820		496705	2.762	1ICR 13
	721 TON	237.562	14.720	16.630	420.000		688.911		
1ICR 14	POUR WALLS & ROOF SLAB	135204	13808	9464	345740		504216	2.804	1ICR 14
	11320 CY	11.944	1.220	.836	30.542		44.542		
1ICR 15	PLACE ROOF WATERPROOF					143500	143500	.798	1ICR 15
	14000 SY					10.250	10.250		
1ICR 16	MORTAR PROT.FOR W.P.	25707	3691	3479	59667		92544	.515	1ICR 16
	1540 CY	16.693	2.397	2.259	38.745		60.094		
1ICR 17	FORM PLENUM DECK	81576		8380			89956	.500	1ICR 17
	2000 LF	40.788		4.190			44.978		
1ICR 18	PLEN.DECK REBAR	60160	2650	4211	76800		143821	.800	1ICR 18
	240 TON	250.667	11.042	17.546	320.000		599.254		
1ICR 19	POUR PLENUM DECK	55226	9466	3866	99674		168232	.935	1ICR 19
	3000 CY	18.409	3.155	1.289	33.225		56.077		
1ICR 20	CONST.PLENUM DIV. WALL	20218	1261	2105	12250		35834	.199	1ICR 20
	200 CY	101.090	6.305	10.525	61.250		179.170		
1ICR 21	ELECTRICAL EMBEDDED					230000	230000	1.279	1ICR 21
1ICR 22	MECHANICAL EMBEDDED					105000	105000	.584	1ICR 22
1ICR 23	PATCH&POINT CONC.WORK	69143		4840	3985		77968	.434	1ICR 23
	339000 SF	.204		.014	.012		.230		

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1ICR 24	CLEAN UP STRUCTURE	11829	662	828			13319	.074	1ICR 24
	20 DA	591.450	33.100	41.400			665.950		
1ICR ITEM	CONSTRUCT PERM.STRUCT.	1726868	86339	282395	2591908	478500	5166010	28.725	1ICR ITEM
	41740 CY	41.372	2.068	6.766	62.097	11.464	123.766		
1JEN 4	BACKFILL & TMP.TOP 5FT	62950	7819	4407	37200		112376	.625	1JEN 4
	9300 CY	6.769	.841	.474	4.000		12.083		
1JEN ITEM	BACKFILL	62950	7819	4407	37200		112376	.625	1JEN ITEM
	9300 CY	6.769	.841	.474	4.000		12.083		
1K00 1	PLACE 6IN SUBGRADE	13803	3800	966	16700		35269	.196	1K00 1
	13350 SY	1.034	.285	.072	1.251		2.642		
1K00 2	PLACE 4IN BASE COURSE	13803	3800	966	10680		29249	.163	1K00 2
	13350 SY	1.034	.285	.072	.800		2.191		
1K00 3	STREET PAVING					42343	42343	.235	1K00 3
	13350 SY					3.172	3.172		
1K00 5	BREAKOUT REM. SIDEWALK	13783	5736	965			20484	.114	1K00 5
	5870 SY	2.348	.977	.164			3.490		
1K00 6	BF&TMP.SIDEWALK VAULTS	66686	8283	4668	40000		119637	.665	1K00 6
	9852 CY	6.769	.841	.474	4.060		12.143		
1K00 7	PLACE 4IN SIDEWK.SUBGR	13416	3693	939	5200		23248	.129	1K00 7
	7785 SY	1.723	.474	.121	.668		2.986		

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1K00	8	PLACE 4IN CONC.SIDEWLK	45719		4340	27307		77366	.430	1K00 8
		7785 SY	5.873		.557	3.508		9.938		
1K00	9	ACCESS WALKWAY	18663	1325	5554			25542	.142	1K00 9
		40 DA	466.575	33.125	138.850			638.550		
1K00	ITEM	STREET RESTORATION	185873	26637	18398	99887	42343	373138	2.075	1K00 ITEM
		13350 SY	13.923	1.995	1.378	7.482	3.172	27.950		
1N00	1	FIXED EXPENSE	67200	30000	166204			263404	1.465	1N00 1
1N00	ITEM	OVERHEAD-FIXED COSTS	67200	30000	166204			263404	1.465	1N00 ITEM
1OLN	1	OVERHEAD LABOR	980000		68600			1048600	5.831	1OLN 1
		31 MO	31612.903		2212.903			33825.806		
1OLN	2	OVERHEAD EXPENSES			325550			325550	1.810	1OLN 2
		31 MO			10501.613			10501.613		
1OLN	3	GENERAL SERVICE CREW	815402	69304	57078			941784	5.237	1OLN 3
		540 DA	1510.004	128.341	105.700			1744.044		
1OLN	4	VEHICLE OPERATION		31000				31000	.172	1OLN 4
		31 MO		1000.000				1000.000		
1OLN	ITEM	OVERHEAD-TIME RELATED	1795402	100304	451228			2346934	13.050	1OLN ITEM
		31 MO	57916.194	3235.613	14555.742			75707.548		

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1P00 1	FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	1.147	1P00 1
1P00 ITEM	PLANT-FIXED COSTS	82760	25000	79793		18800	206353	1.147	1P00 ITEM
1QLN 1	TIME RELATED COSTS			159600			159600	.887	1QLN 1
	31 MO			5148.387			5148.387		
1QLN ITEM	PLANT-TIME RELATED			159600			159600	.887	1QLN ITEM
	31 MO			5148.387			5148.387		

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

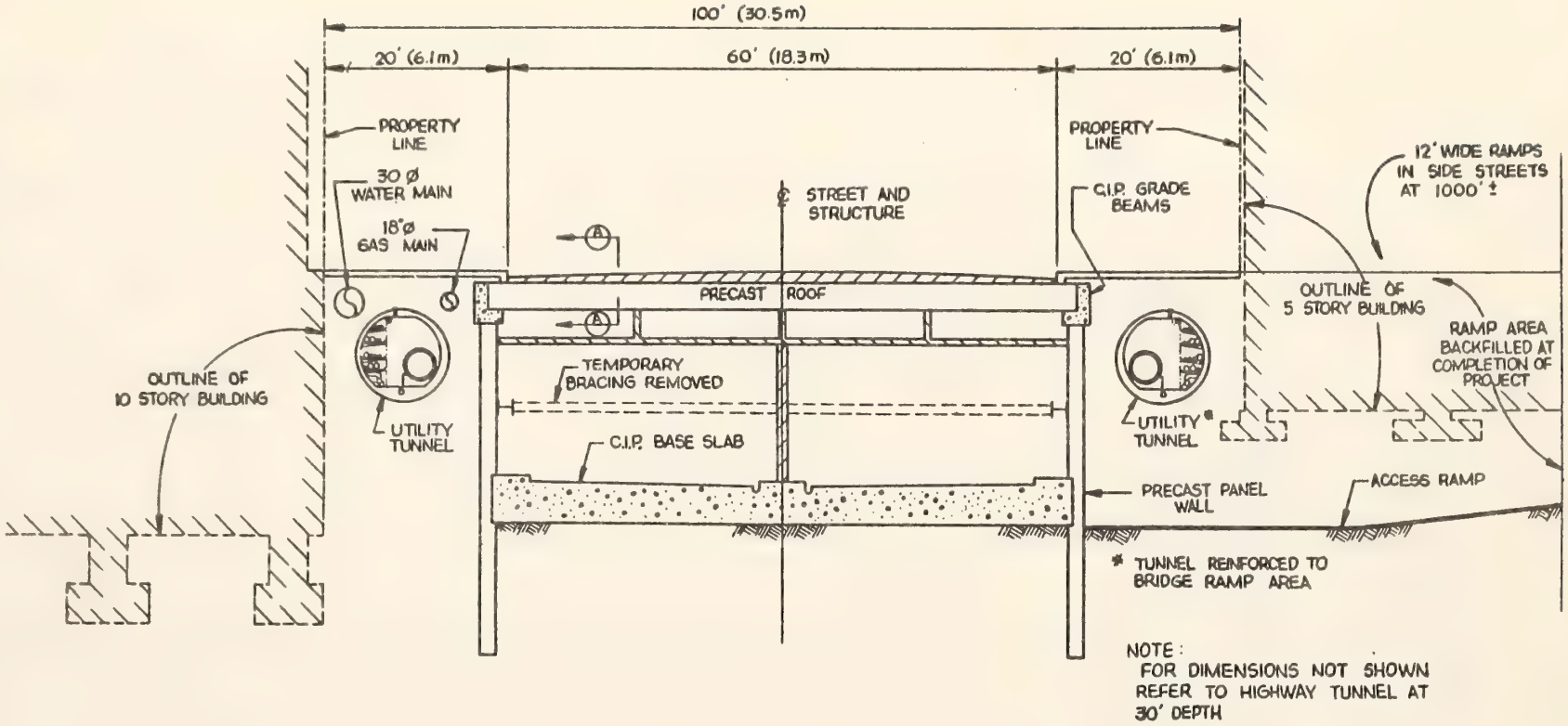
TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6457740	1234673	3871507	3492526	2927691	17984137	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 1-4LT

INVERTED CONSTRUCTION METHOD
FOUR LANE HIGHWAY TUNNEL
SITE 1 - 30' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
INTERNAL BRACING

This is one of three estimates produced by computer extension for this study, to test the methods and results of the series of 176 estimates forming the basis of the study effort. Based on this series of estimates, a highway tunnel, at minimum depth, with precast concrete panel walls was chosen to test innovative basic construction methods. Traditional cut-and-cover construction (1-1LT), inverted construction (1-4LT) and combination (or partially inverted) construction (1-7LT) are compared under the same site and structure conditions. The relation of estimate 1-1LT in the series of 176 estimates is shown graphically in Table 1.



Note: Soil Profile same as for Project 1-1LY, Figure 3, Page 30.

Figure 14. PROJECT 1-4LT - INVERTED CONSTRUCTION
HIGHWAY TUNNEL - SITE 1 - 30' DEPTH
PRECAST CONCRETE PANELS - INTERNAL BRACING

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	7766335	2162975	2958664	4348048	3492933	20728955	100.000
PROJECT						20728955	100.000

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
4A00 1	CONST.BARRICADES ETC.	28169	778	24922			53869	.260	4A00 1
	30 DA	938.967	25.933	830.733			1795.633		
4A00 2	SET&MOVE BARRICADES ET	19205	1812	4599			25616	.124	4A00 2
	30 DA	640.167	60.400	153.300			853.867		
4A00 3	FLAGMEN-DIRECT TRAFFIC	43322		3033			46355	.224	4A00 3
	280 DA	154.721		10.832			165.554		
4A00 ITEM	CONTROL TRAFFIC	90696	2590	32554			125840	.607	4A00 ITEM
4BD0 11	EXCAV SHAFTS @ INTER	108667	24082	87716			220465	1.064	4BD0 11
	8 EA	13583.375	3010.250	10964.500			27558.125		
4BD0 12	EXCAV UTILIDOR TUNNELS	1187360	605848	425325			2218533	10.703	4BD0 12
	4000 LF	296.840	151.462	106.331			554.633		
4BD0 13	CONC. UTILITY TUNNELS	407584	64264	99771	192415		764034	3.686	4BD0 13
	4000 LF	101.896	16.066	24.943	48.104		191.009		
4BD0 14	COMPL. & CLEAN TUNNELS	83229	21152	5826	94140		204347	.986	4BD0 14
	4000 LF	20.807	5.288	1.457	23.535		51.087		
4BD0 20	UTIL.SHAFT SERV.CREW	94115	30656	6588			131359	.634	4BD0 20
	80 DA	1176.438	383.200	82.350			1641.988		
4BD0 24	STORM DR&SEW.PERM.LONG					280000	280000	1.351	4BD0 24
	4000 LF					70.000	70.000		
4BD0 26	SEWER PERM. LONGIT.					96000	96000	.463	4BD0 26
	4000 LF					24.000	24.000		

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
4BD0 30	STM.DR.LATER.PERM.LONG					2400	2400	.012	4BD0 30
	8 EA					300.000	300.000		
4BD0 32	STM.DR.LATER.PERM.INT.					2400	2400	.012	4BD0 32
	8 EA					300.000	300.000		
4BD0 33	BLDG.SEW.LATERALS PERM					3667	3667	.018	4BD0 33
	55 EA					66.673	66.673		
4BD0 35	MANHOLES SEW.PERM.LONG					9200	9200	.044	4BD0 35
	8 EA					1150.000	1150.000		
4BD0 37	MANHOLES SEW.PERM.INT.					9200	9200	.044	4BD0 37
	4 EA					2300.000	2300.000		
4BD0 38	CATCH BASINS LONGIT.					7600	7600	.037	4BD0 38
	8 EA					950.000	950.000		
4BD0 39	CATCH BASINS INTER.					7600	7600	.037	4BD0 39
	8 EA					950.000	950.000		
4BD0 41	RELOCATE WAT.MAIN 30IN					275000	275000	1.327	4BD0 41
	2000 LF					137.500	137.500		
4BD0 42	WATER 8IN-TUN. INST.					140600	140600	.678	4BD0 42
	4000 LF					35.150	35.150		
4BD0 44	RELOCATE FIRE HYD.LONG					10000	10000	.048	4BD0 44
	4 EA					2500.000	2500.000		
4BD0 45	RELOCATE FIRE HYD.INT.					20000	20000	.096	4BD0 45
	8 EA					2500.000	2500.000		

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
4BD0 51	RELOC.18IN. GAS MAIN					165000	165000	.796	4BD0 51
	2000 LF					82.500	82.500		
4BD0 55	6 IN. GAS-TUN.INST.					142000	142000	.685	4BD0 55
	4000 LF					35.500	35.500		
4BD0 61	TELEPH.CDT.-TUN. INST.					180000	180000	.868	4BD0 61
	2000 LF					90.000	90.000		
4BD0 64	TELEPHONE MANHOLE INT.					79920	79920	.386	4BD0 64
	4 EA					19980.000	19980.000		
4BD0 71	ELECT. CDT.-TUN. INST.					156000	156000	.753	4BD0 71
	2000 LF					78.000	78.000		
4BD0 73	ST.LT&TR.SIG.COND.INT.					19000	19000	.092	4BD0 73
	4 EA					4750.000	4750.000		
4BD0 74	STREET LIGHT TEMP.LONG	5185	265	363			5813	.028	4BD0 74
	24 EA	216.042	11.042	15.125			242.208		
4BD0 75	STREET LIGHT PERM.LONG	5185	265	363		5040	10853	.052	4BD0 75
	24 EA	216.042	11.042	15.125		210.000	452.208		
4BD0 76	TR.SIG.CONTRL.TEMP INT	5185	265	363	8000		13813	.067	4BD0 76
	4 EA	1296.250	66.250	90.750	2000.000		3453.250		
4BD0 77	TR.SIG.CONTRL.PERM INT	5185	265	363		600	6413	.031	4BD0 77
	4 EA	1296.250	66.250	90.750		150.000	1603.250		
4BD0 78	PED.&TRAFFIC SIG.PERM.	4387	265	307		4800	9759	.047	4BD0 78
	4 EA	1096.750	66.250	76.750		1200.000	2439.750		

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
4BD0 80	CONN. BLDG. LATERALS					110000	110000	.531	4BD0 80
	55 EA					2000.000	2000.000		
4BD0 85	CONN UTIL AT INT.SHAFT	25399	8028	1778		60000	95205	.459	4BD0 85
	8 EA	3174.875	1003.500	222.250		7500.000	11900.625		
4BD0 ITEM	UTILIDORS & UTILITIES	1931481	755355	628763	294555	1786027	5396181	26.032	4BD0 ITEM
4CD0 1	GENL EXTERIOR PROTECT	21501	6955	7550			36006	.174	4CD0 1
	40 DA	537.525	173.875	188.750			900.150		
4CD0 2	SIDEWALK VAULTS &WALLS	94179	18024	21703	22979		156885	.757	4CD0 2
	1000 LF	94.179	18.024	21.703	22.979		156.885		
4CD0 ITEM	PROTECT ADJ STRUCTURES	115680	24979	29253	22979		192891	.931	4CD0 ITEM
4DDT 1	FURNISH,INSTALL&REMOVE					280634	280634	1.354	4DDT 1
4DDT 2	MAINT SYST-FIRST 6 MOS					189632	189632	.915	4DDT 2
	6 MO					31605.333	31605.333		
4DDT 3	MAINT SYST-AFTER 6 MOS					168810	168810	.814	4DDT 3
	5 MO					33762.000	33762.000		
4DDT ITEM	CONTROL GROUND WATER					639076	639076	3.083	4DDT ITEM
4FCT 1	MOB.SLURRY PLT,EQUIP.	17083	30490	1196			48769	.235	4FCT 1
	30 DA	569.433	1016.333	39.867			1625.633		

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT.BR-30 FOOT DOT 1-4LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
4FCT 2	PRECAST YARD	74580	34887	5221	732651	129260	976599	4.711	4FCT 2
	45 DA	1657.333	775.267	116.022	16281.133	2872.444	21702.200		
4FCT 3	TRENCH @ WALL LOCATION	88368	12400	77997			178765	.862	4FCT 3
	4000 LF	22.092	3.100	19.499			44.691		
4FCT 4	EXCV SLOT FOR PANELS	71055	90758	4974			166787	.805	4FCT 4
	11852 CY	5.995	7.658	.420			14.072		
4FCT 5	SET PRE-CAST PANELS	108439	55095	24916			188450	.909	4FCT 5
	334 EA	324.668	164.955	74.599			564.222		
4FCT 6	OPERATE SLURRY EQUIP.	183288	41395	227140			451823	2.180	4FCT 6
	140 DA	1309.200	295.679	1622.429			3227.307		
4FCT 7	DEMOBE.SLURRY EQUIP.	9927	2816	695			13438	.065	4FCT 7
	10 DA	992.700	281.600	69.500			1343.800		
4FCT 9	CLN.PNL.& PATCH JT.	55015	12343	12797			80155	.387	4FCT 9
	140 DA	392.964	88.164	91.407			572.536		
4FCT ITEM	GROUND SUPPORT WALL	607755	280184	354936	732651	129260	2104786	10.154	4FCT ITEM
	13333 SY	45.583	21.014	26.621	54.950	9.695	157.863		
4GEN 1	SET BRACING LEVEL NO 2	139803	49948	271786			461537	2.227	4GEN 1
	524 TON	266.800	95.321	518.676			880.796		
4GEN 2	PRESTRESS LEVEL NO 2	28570	666	2000			31236	.151	4GEN 2
	524 TON	54.523	1.271	3.817			59.611		

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
4GEN 14	REMOVE BRACING LEVEL 2	53296	27718	3731			84745	.409	4GEN 14
	524 TON	101.710	52.897	7.120			161.727		
4GEN ITEM	INTERNAL BRACING	221669	78332	277517			577518	2.786	4GEN ITEM
	524 TON	423.032	149.489	529.613			1102.134		
4HEN 1	BREAK PAVEMENT & HAUL	32871	13680	2301			48852	.236	4HEN 1
	14000 SY	2.348	.977	.164			3.489		
4HEN 2	EXCAVATE FIRST 5 FT	125744	60745	8802			195291	.942	4HEN 2
	23300 CY	5.397	2.607	.378			8.382		
4HEN 11	2 SIDE RAMPS-BRK PAVE	2818	1173	197			4188	.020	4HEN 11
	960 SY	2.935	1.222	.205			4.363		
4HEN 12	2 SIDE RAMPS-SOLD.PILE	37188	11942	46902			96032	.463	4HEN 12
	2800 LF	13.281	4.265	16.751			34.297		
4HEN 13	2 SIDE RAMPS-LAGGING	22530	2067	11917			36514	.176	4HEN 13
	15600 SF	1.444	.133	.764			2.341		
4HEN 14	2 SIDE RAMPS-EXCAVATE	15111	7299	1058			23468	.113	4HEN 14
	3500 CY	4.317	2.085	.302			6.705		
4HEN 15	2 SIDE RAMPS-CONC SLAB	6761	690	6433			13884	.067	4HEN 15
	5 DA	1352.200	138.000	1286.600			2776.800		
4HEN 21	"Y" DEVEL.AT RAMPS	42497	53526	2975			98998	.478	4HEN 21
	11600 CY	3.664	4.614	.256			8.534		

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
4HEN 22	GENL EXCAV UNDER ROOF	256228	337756	17936			611920	2.952	4HEN 22
	105000 CY	2.440	3.217	.171			5.828		
4HEN 27	FINE GRADE INVERT	60183	27603	4213			91999	.444	4HEN 27
	14000 SY	4.299	1.972	.301			6.571		
4HEN ITEM	EXCAVATION	601931	516481	102734			1221146	5.891	4HEN ITEM
	139900 CY	4.303	3.692	.734			8.729		
4ICR 31	PREP FOR ROOF GRD BEAM	70695	9920	8099			88714	.428	4ICR 31
	4000 LF	17.674	2.480	2.025			22.179		
4ICR 32	FORM ROOF GRADE BEAMS	47866		9931			57797	.279	4ICR 32
	4000 LF	11.967		2.483			14.449		
4ICR 33	REINF FOR ROOF GR BEAM	46150		3231	75600		124981	.603	4ICR 33
	180 TON	256.389		17.950	420.000		694.339		
4ICR 34	POUR ROOF GRADE BEAMS	74190	16345	5193	73250		168978	.815	4ICR 34
	2400 CY	30.913	6.810	2.164	30.521		70.408		
4ICR 35	PRECAST YARD-ROOF BEAM	215458	116387	15082	1029057	362800	1738784	8.388	4ICR 35
	130 DA	1657.369	895.285	116.015	7915.823	2790.769	13375.262		
4ICR 36	SET PRECAST ROOF PANEL	115916	39199	30639			185754	.896	4ICR 36
	500 EA	231.832	78.398	61.278			371.508		
4ICR 37	CONSTRUCT PERM.STRUCT.					143500	143500	.692	4ICR 37
	14000 SY					10.250	10.250		

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
4ICR 38	MORTAR PROT.FOR W.P.	25707	3691	3479	59667		92544	.446	4ICR 38
	1540 CY	16.693	2.397	2.259	38.745		60.094		
4ICR 41	LEVELING SLAB FORMS	11966		3988			15954	.077	4ICR 41
	20 EA	598.300		199.400			797.700		
4ICR 42	POUR LEVELING SLAB	27040	2762	1893	45982		77677	.375	4ICR 42
	1540 CY	17.558	1.794	1.229	29.858		50.440		
4ICR 43	BASE SLAB REBAR,	347814	52229	24347	808920		1233310	5.950	4ICR 43
	1926 TON	180.589	27.118	12.641	420.000		640.348		
4ICR 44	BASE SLAB BLKHDS&WK.FM	111766		12599			124365	.600	4ICR 44
	18680 SF	5.983		.674			6.658		
4ICR 45	BASE SLAB-POUR,CLEANUP	135204	13808	9464	782310		940786	4.539	4ICR 45
	25680 CY	5.265	.538	.369	30.464		36.635		
4ICR 49	ASSEM.STL.WL&PL FRM	16055	1460	133924			151439	.731	4ICR 49
	15 DA	1070.333	97.333	8928.267			10095.933		
4ICR 51	WALL REBAR	39106	2423	2737	53760		98026	.473	4ICR 51
	128 TON	305.516	18.930	21.383	420.000		765.828		
4ICR 52	MOVE & SET STEEL FORMS	46589		15811			62400	.301	4ICR 52
	2000 LF	23.295		7.906			31.200		
4ICR 54	POUR CENTER WALLS	54080	5524	3786	52301		115691	.558	4ICR 54
	1700 CY	31.812	3.249	2.227	30.765		68.054		
4ICR 57	FORM PLENUM DECK	81576		8380			89956	.434	4ICR 57
	2000 LF	40.788		4.190			44.978		

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
4ICR 58	PLEN.DECK REBAR	60160	2650	4211	76800		143821	.694	4ICR 58
	240 TON	250.667	11.042	17.546	320.000		599.254		
4ICR 59	POUR PLENUM DECK	55226	9466	3866	99674		168232	.812	4ICR 59
	3000 CY	18.409	3.155	1.289	33.225		56.077		
4ICR 60	CONST.PLENUM DIV. WALL	20218	1261	2105	12250		35834	.173	4ICR 60
	200 CY	101.090	6.305	10.525	61.250		179.170		
4ICR 61	ELECTRICAL EMBEDDED					230000	230000	1.110	4ICR 61
4ICR 62	MECHANICAL EMBEDDED					105000	105000	.507	4ICR 62
4ICR 63	PATCH&POINT CONC.WORK	69143		4840	3985		77968	.376	4ICR 63
	339000 SF	.204		.014	.012		.230		
4ICR 64	CLEAN UP STRUCTURE	11829	662	828			13319	.064	4ICR 64
	20 DA	591.450	33.100	41.400			665.950		
4ICR ITEM	CONSTRUCT PERM.STRUCT.	1683754	277787	308433	3173556	841300	6284830	30.319	4ICR ITEM
	47460 CY	35.477	5.853	6.499	66.868	17.727	132.424		
4JEN 11	BACKFILL UTIL. SHAFTS	9620	1356	673	6000		17649	.085	4JEN 11
	1500 CY	6.413	.904	.449	4.000		11.766		
4JEN 12	2 SIDE RAMPS-BACKFILL	18952	2354	1327	14000		36633	.177	4JEN 12
	3500 CY	5.415	.673	.379	4.000		10.467		
4JEN ITEM	BACKFILL	28572	3710	2000	20000		54282	.262	4JEN ITEM
	5000 CY	5.714	.742	.400	4.000		10.856		

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

			TOTAL COST ANALYSIS			PROJECT SUMMARY				
			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
4K00	1	PLACE 6IN SUBGRADE	15925	4383	1115	19500		40923	.197	4K00 1
		15400 SY	1.034	.285	.072	1.266		2.657		
4K00	2	PLACE 4IN BASE COURSE	15925	4383	1115	12300		33723	.163	4K00 2
		15400 SY	1.034	.285	.072	.799		2.190		
4K00	3	STREET PAVING					48470	48470	.234	4K00 3
		15400 SY					3.147	3.147		
4K00	5	BREAKOUT REM. SIDEWALK	13783	5736	965			20484	.099	4K00 5
		5870 SY	2.348	.977	.164			3.490		
4K00	6	BF&TMP.SIDEWALK VAULTS	66686	8283	4668	40000		119637	.577	4K00 6
		9852 CY	6.769	.841	.474	4.060		12.143		
4K00	7	PLACE 4IN SIDEWK.SUBGR	13416	3693	939	5200		23248	.112	4K00 7
		7785 SY	1.723	.474	.121	.668		2.986		
4K00	8	PLACE 4IN CONC.SIDEWLK	45719		4340	27307		77366	.373	4K00 8
		7785 SY	5.873		.557	3.508		9.938		
4K00	9	ACCESS WALKWAY	18663	1325	5554			25542	.123	4K00 9
		40 DA	466.575	33.125	138.850			638.550		
4K00	ITEM	STREET RESTORATION	190117	27803	18696	104307	48470	389393	1.878	4K00 ITEM
		15400 SY	12.345	1.805	1.214	6.773	3.147	25.285		
4N00	1	FIXED EXPENSE	78750	34000	208013			320763	1.547	4N00 1
4N00	ITEM	OVERHEAD-FIXED COSTS	78750	34000	208013			320763	1.547	4N00 ITEM

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
4OLN 1	OVERHEAD LABOR	1193400		83538			1276938	6.160	4OLN 1
	35 MO	34097.143		2386.800			36483.943		
4OLN 2	OVERHEAD EXPENSES			367750			367750	1.774	4OLN 2
	35 MO			10507.143			10507.143		
4OLN 3	GENERAL SERVICE CREW	906000	77004	63420			1046424	5.048	4OLN 3
	600 DA	1510.000	128.340	105.700			1744.040		
4OLN 4	VEHICLE OPERATION		47250				47250	.228	4OLN 4
	35 MO		1350.000				1350.000		
4OLN ITEM	OVERHEAD-TIME RELATED	2099400	124254	514708			2738362	13.210	4OLN ITEM
	35 MO	59982.857	3550.114	14705.943			78238.914		
4P00 1	FIXED PLANT EXPENSES	116530	37500	185157		48800	387987	1.872	4P00 1
4P00 ITEM	PLANT-FIXED COSTS	116530	37500	185157		48800	387987	1.872	4P00 ITEM
4QLN 1	TIME RELATED COSTS			295900			295900	1.427	4QLN 1
	35 MO			8454.286			8454.286		
4QLN ITEM	PLANT-TIME RELATED			295900			295900	1.427	4QLN ITEM
	35 MO			8454.286			8454.286		

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

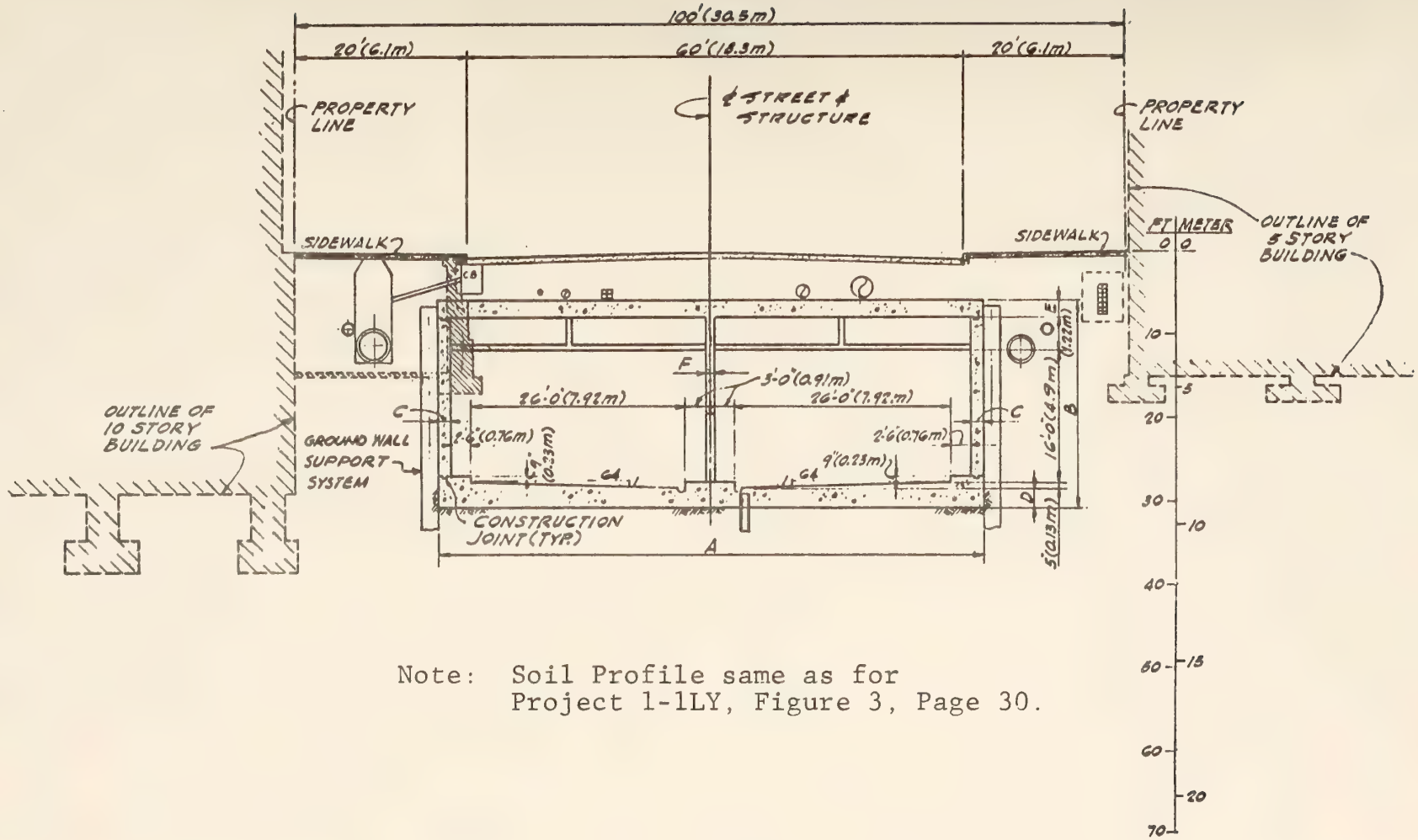
TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	7766335	2162975	2958664	4348048	3492933	20728955	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 1-7LT

PARTIALLY INVERTED CONSTRUCTION METHOD
FOUR LANE HIGHWAY TUNNEL
SITE 1 - 30' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
INTERNAL BRACING

This is one of three estimates produced by computer extension for this study, to test the methods and results of the series of 176 estimates forming the basis of the study effort. Based on this series of estimates, a highway tunnel, at minimum depth, with precast concrete panel walls was chosen to test innovative basic construction methods. Traditional cut-and-cover construction (1-1LT), inverted construction (1-4LT) and combination (or partially inverted) construction (1-7LT) are compared under the same site and structure conditions. The relation of estimate 1-1LT in the series of 176 estimates is shown graphically in Table 1.



Note: Soil Profile same as for Project 1-1LY, Figure 3, Page 30.

Figure 15. PROJECT 1-7LT - COMBINATION CONSTRUCTION HIGHWAY TUNNEL - SITE 1 - 30' DEPTH PRECAST CONCRETE PANELS - INTERNAL BRACING

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6423039	1252338	3859495	3500796	2903454	17939122	100.000
PROJECT						17939122	100.000

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
7A00	1	CONST.BARRICADES ETC.	42253	1166	37713			81132	.452	7A00 1
		45 DA	938.956	25.911	838.067			1802.933		
7A00	2	SET&MOVE BARRICADES ET	28807	2718	5271			36796	.205	7A00 2
		45 DA	640.156	60.400	117.133			817.689		
7A00	3	FLAGMEN-DIRECT TRAFFIC	32491		2274			34765	.194	7A00 3
		210 DA	154.719		10.829			165.548		
7A00	ITEM	CONTROL TRAFFIC	103551	3884	45258			152693	.851	7A00 ITEM
7BD1	1	ALL OPERATIONS	198151	18680	199450	8000	1719712	2143993	11.951	7BD1 1
7BD1	ITEM	UTILITY WORK-ALTERNATE	198151	18680	199450	8000	1719712	2143993	11.951	7BD1 ITEM
7CD0	1	GENL EXTERIOR PROTECT	21501	6955	7550			36006	.201	7CD0 1
		40 DA	537.525	173.875	188.750			900.150		
7CD0	2	SIDEWALK VAULTS &WALLS	94179	18024	21703	22979		156885	.875	7CD0 2
		1000 LF	94.179	18.024	21.703	22.979		156.885		
7CD0	ITEM	PROTECT ADJ STRUCTURES	115680	24979	29253	22979		192891	1.075	7CD0 ITEM
7DDT	1	FURNISH,INSTALL&REMOVE					260634	260634	1.453	7DDT 1
7DDT	2	MAINT SYST-FIRST 6 MOS					149632	149632	.834	7DDT 2
		6 MO					24938.667	24938.667		

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
7DDT	3	MAINT SYST-AFTER 6 MOS					103048	103048	.574	7DDT 3
		4 MO					25762.000	25762.000		
7DDT	ITEM	CONTROL GROUND WATER					513314	513314	2.861	7DDT ITEM
7E00	1	CENTER PILE EXPL HOLE	14847	2083	4339			21269	.119	7E00 1
		168 EA	88.375	12.399	25.827			126.601		
7E00	2	DRILL HOLES-CENTR PILE	37399	44294	2618			84311	.470	7E00 2
		168 EA	222.613	263.655	15.583			501.851		
7E00	3	OPERATE SLURRY EQUIP	24439	5520	4774			34733	.194	7E00 3
		56 SH	436.411	98.571	85.250			620.232		
7E00	4	SPLICE,PLACE,TRIM,PILE	34065	12555	82025			128645	.717	7E00 4
		168 EA	202.768	74.732	488.244			765.744		
7E00	5	BACKFILL PILE HOLES	14776	3706	14653			33135	.185	7E00 5
		168 EA	87.952	22.060	87.220			197.232		
7E00	6	PILE CAPS,WALES,DECKBM	237227	51971	949106			1238304	6.903	7E00 6
		1865 TON	127.199	27.866	508.904			663.970		
7E00	7	LATERAL & SWAY BRACING	77158	13850	110401			201409	1.123	7E00 7
		150 TON	514.387	92.333	736.007			1342.727		
7E00	8	DECK MATS & TIMBERS	74747	5520	541887			622154	3.468	7E00 8
		15333 SY	4.875	.360	35.341			40.576		
7E00	9	REPOST DECK SUPPORT	81144	25140	18280			124564	.694	7E00 9
		168 EA	483.000	149.643	108.810			741.452		

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
7E00 11	REMOVE TIMBER DECKING	34974	5403	2448			42825	.239	7E00 11
	15333 SY	2.281	.352	.160			2.793		
7E00 12	RMV.DECK BMS.&INT.PILE	82189	35123	5753			123065	.686	7E00 12
	1859 TON	44.211	18.893	3.095			66.200		
7E00 13	REMOVE WALES & CAPS	31832	13603	2228			47663	.266	7E00 13
	450 TON	70.738	30.229	4.951			105.918		
7E00 14	REM.LAG.&PILES TO -6	31831	8611	2228			42670	.238	7E00 14
	4000 LF	7.958	2.153	.557			10.668		
7E00 ITEM	STREET DECKING	776628	227379	1740740			2744747	15.300	7E00 ITEM
	15333 SY	50.651	14.829	113.529			179.009		
7FCT 1	MOB.SLURRY PLT,EQUIP.	17083	30490	1196			48769	.272	7FCT 1
	30 DA	569.433	1016.333	39.867			1625.633		
7FCT 2	PRECAST YARD	74580	34887	5221	732552	129260	976500	5.443	7FCT 2
	45 DA	1657.333	775.267	116.022	16278.933	2872.444	21700.000		
7FCT 3	TRENCH @ WALL LOCATION	88368	12400	77997			178765	.997	7FCT 3
	4000 LF	22.092	3.100	19.499			44.691		
7FCT 4	EXCV SLOT FOR PANELS	71055	90758	4974			166787	.930	7FCT 4
	11852 CY	5.995	7.658	.420			14.072		
7FCT 5	SET PRE-CAST PANELS	108439	55095	24916			188450	1.050	7FCT 5
	334 EA	324.668	164.955	74.599			564.222		

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
7FCT 6	OPERATE SLURRY EQUIP.	183288	41395	227140			451823	2.519	7FCT 6
	140 DA	1309.200	295.679	1622.429			3227.307		
7FCT 7	DEMOBE.SLURRY EQUIP.	9927	2816	695			13438	.075	7FCT 7
	10 DA	992.700	281.600	69.500			1343.800		
7FCT 8	PLACE LAGGING 1ST.10FT	57770	5299	30444			93513	.521	7FCT 8
	40000 SF	1.444	.132	.761			2.338		
7FCT 9	CLN.PNL.& PATCH JT.	55015	12343	12797			80155	.447	7FCT 9
	140 DA	392.964	88.164	91.407			572.536		
7FCT ITEM	GROUND SUPPORT WALL	665525	285483	385380	732552	129260	2198200	12.254	7FCT ITEM
	13333 SY	49.916	21.412	28.904	54.943	9.695	164.869		
7GEN 1	SET BRACING LEVEL NO 2	98787	28816	268915			396518	2.210	7GEN 1
	524 TON	188.525	54.992	513.197			756.714		
7GEN 2	PRESTRESS LEVEL NO 2	22754	530	1593			24877	.139	7GEN 2
	524 TON	43.424	1.011	3.040			47.475		
7GEN 14	REMOVE BRACING LEVEL 2	38662	16237	2706			57605	.321	7GEN 14
	524 TON	73.782	30.987	5.164			109.933		
7GEN ITEM	INTERNAL BRACING	160203	45583	273214			479000	2.670	7GEN ITEM
	524 TON	305.731	86.990	521.401			914.122		
7HEN 1	BREAK PAVEMENT & HAUL	32871	13680	2301			48852	.272	7HEN 1
	14000 SY	2.348	.977	.164			3.489		

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
7HEN 2	EXCAVATE FIRST 5 FT	125744	60745	8802			195291	1.089	7HEN 2
	23300 CY	5.397	2.607	.378			8.382		
7HEN 3	EXCAVATE 5 TO 22 FT	201739	151609	14122			367470	2.048	7HEN 3
	79300 CY	2.544	1.912	.178			4.634		
7HEN 4	EXCAVATE 22 TO 30 FT	91770	98949	6424			197143	1.099	7HEN 4
	37300 CY	2.460	2.653	.172			5.285		
7HEN 7	FINE GRADE INVERT	60183	27603	4213			91999	.513	7HEN 7
	14000 SY	4.299	1.972	.301			6.571		
7HEN 8	EXC.&SUPP.ACCESS SHAFT	108667	23244	45175			177086	.987	7HEN 8
	2 EA	54333.500	11622.000	22587.500			88543.000		
7HEN ITEM	EXCAVATION	620974	375830	81037			1077841	6.008	7HEN ITEM
	139900 CY	4.439	2.686	.579			7.704		
7ICR 1	LEVELING SLAB FORMS	11966		3988			15954	.089	7ICR 1
	20 EA	598.300		199.400			797.700		
7ICR 2	POUR LEVELING SLAB	27040	2762	1893	45982		77677	.433	7ICR 2
	1540 CY	17.558	1.794	1.229	29.858		50.440		
7ICR 3	BASE SLAB REBAR,	331847	23735	23229	808920		1187731	6.621	7ICR 3
	1926 TON	172.299	12.323	12.061	420.000		616.683		
7ICR 4	BASE SLAB BLKHDS&WK.FM	111766		12599			124365	.693	7ICR 4
	18680 SF	5.983		.674			6.658		

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
7ICR 5	BASE SLAB-POUR,CLEANUP	135204	13808	9464	782310		940786	5.244	7ICR 5
	25680 CY	5.265	.538	.369	30.464		36.635		
7ICR 9	ASSEM.STL.WL&RF&PL FRM	16055	1460	137124			154639	.862	7ICR 9
	15 DA	1070.333	97.333	9141.600			10309.267		
7ICR 11	WALL REBAR	39106	2423	2737	53760		98026	.546	7ICR 11
	128 TON	305.516	18.930	21.383	420.000		765.828		
7ICR 12	MOVE & SET STEEL FORMS	423539		42198			465737	2.596	7ICR 12
	2000 LF	211.770		21.099			232.869		
7ICR 13	ROOF SLAB REBAR	171282	10613	11990	302820		496705	2.769	7ICR 13
	721 TON	237.562	14.720	16.630	420.000		688.911		
7ICR 14	POUR WALLS & ROOF SLAB	135204	13808	9464	345740		504216	2.811	7ICR 14
	11320 CY	11.944	1.220	.836	30.542		44.542		
7ICR 15	PLACE ROOF WATERPROOF					143500	143500	.800	7ICR 15
	14000 SY					10.250	10.250		
7ICR 16	MORTAR PROT.FOR W.P.	25707	3691	3479	59667		92544	.516	7ICR 16
	1540 CY	16.693	2.397	2.259	38.745		60.094		
7ICR 17	FORM PLENUM DECK	81576		8380			89956	.501	7ICR 17
	2000 LF	40.788		4.190			44.978		
7ICR 18	PLEN.DECK REBAR	72192	3180	5053	76800		157225	.876	7ICR 18
	240 TON	300.800	13.250	21.054	320.000		655.104		
7ICR 19	POUR PLENUM DECK	69032	11832	4832	99674		185370	1.033	7ICR 19
	3000 CY	23.011	3.944	1.611	33.225		61.790		

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
7ICR 20	CONST.PLENUM DIV. WALL	25272	1576	2459	12250		41557	.232	7ICR 20
	200 CY	126.360	7.880	12.295	61.250		207.785		
7ICR 21	ELECTRICAL EMBEDDED					230000	230000	1.282	7ICR 21
7ICR 22	MECHANICAL EMBEDDED					105000	105000	.585	7ICR 22
7ICR 23	PATCH&POINT CONC.WORK	81347		5694	3985		91026	.507	7ICR 23
	339000 SF	.240		.017	.012		.269		
7ICR 24	CLEAN UP STRUCTURE	11829	662	828			13319	.074	7ICR 24
	20 DA	591.450	33.100	41.400			665.950		
7ICR ITEM	CONSTRUCT PERM.STRUCT.	1769964	89550	285411	2591908	478500	5215333	29.072	7ICR ITEM
	41740 CY	42.405	2.145	6.838	62.097	11.464	124.948		
7JEN 4	BACKFILL & TMP.TOP 5FT	62950	7819	4407	37200		112376	.626	7JEN 4
	9300 CY	6.769	.841	.474	4.000		12.083		
7JEN 5	BACKFILL ACCESS SHAFTS	11543	1627	808	7200		21178	.118	7JEN 5
	1800 CY	6.413	.904	.449	4.000		11.766		
7JEN ITEM	BACKFILL	74493	9446	5215	44400		133554	.744	7JEN ITEM
	11100 CY	6.711	.851	.470	4.000		12.032		
7K00 1	PLACE 6IN SUBGRADE	14321	3942	1002	17350		36615	.204	7K00 1
	13850 SY	1.034	.285	.072	1.253		2.644		
7K00 2	PLACE 4IN BASE COURSE	14321	3942	1002	11100		30365	.169	7K00 2
	13850 SY	1.034	.285	.072	.801		2.192		

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
7K00	3	STREET PAVING					43868	43868	.245	7K00 3
		13850 SY					3.167	3.167		
7K00	5	BREAKOUT REM. SIDEWALK	13783	5736	965			20484	.114	7K00 5
		5870 SY	2.348	.977	.164			3.490		
7K00	6	BF&TMP.SIDEWALK VAULTS	66686	8283	4668	40000		119637	.667	7K00 6
		9852 CY	6.769	.841	.474	4.060		12.143		
7K00	7	PLACE 4IN SIDEWK.SUBGR	13416	3693	939	5200		23248	.130	7K00 7
		7785 SY	1.723	.474	.121	.668		2.986		
7K00	8	PLACE 4IN CONC.SIDEWLK	45719		4340	27307		77366	.431	7K00 8
		7785 SY	5.873		.557	3.508		9.938		
7K00	9	ACCESS WALKWAY	18663	1325	5554			25542	.142	7K00 9
		40 DA	466.575	33.125	138.850			638.550		
7K00	ITEM	STREET RESTORATION	186909	26921	18470	100957	43868	377125	2.102	7K00 ITEM
		13850 SY	13.495	1.944	1.334	7.289	3.167	27.229		
7N00	1	FIXED EXPENSE	67200	30000	165704			262904	1.466	7N00 1
7N00	ITEM	OVERHEAD-FIXED COSTS	67200	30000	165704			262904	1.466	7N00 ITEM
7OLN	1	OVERHEAD LABOR	876200		61334			937534	5.226	7OLN 1
		28 MO	31292.857		2190.500			33483.357		
7OLN	2	OVERHEAD EXPENSES			295400			295400	1.647	7OLN 2
		28 MO			10550.000			10550.000		

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
7OLN 3	GENERAL SERVICE CREW	724801	61603	50736			837140	4.667	7OLN 3
	480 DA	1510.002	128.340	105.700			1744.042		
7OLN 4	VEHICLE OPERATION		28000				28000	.156	7OLN 4
	28 MO		1000.000				1000.000		
7OLN ITEM	OVERHEAD-TIME RELATED	1601001	89603	407470			2098074	11.696	7OLN ITEM
	28 MO	57178.607	3200.107	14552.500			74931.214		
7P00 1	FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	1.150	7P00 1
7P00 ITEM	PLANT-FIXED COSTS	82760	25000	79793		18800	206353	1.150	7P00 ITEM
7QLN 1	TIME RELATED COSTS			143100			143100	.798	7QLN 1
	28 MO			5110.714			5110.714		
7QLN ITEM	PLANT-TIME RELATED			143100			143100	.798	7QLN ITEM
	28 MO			5110.714			5110.714		

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6423039	1252338	3859495	3500796	2903454	17939122	100.000

*U.S. GOVERNMENT PRINTING OFFICE: 1980 621-209/886 1-3

FEDERALLY COORDINATED PROGRAM OF HIGHWAY RESEARCH AND DEVELOPMENT (FCP)

The Offices of Research and Development of the Federal Highway Administration are responsible for a broad program of research with resources including its own staff, contract programs, and a Federal-Aid program which is conducted by or through the State highway departments and which also finances the National Cooperative Highway Research Program managed by the Transportation Research Board. The Federally Coordinated Program of Highway Research and Development (FCP) is a carefully selected group of projects aimed at urgent, national problems, which concentrates these resources on these problems to obtain timely solutions. Virtually all of the available funds and staff resources are a part of the FCP, together with as much of the Federal-aid research funds of the States and the NCHRP resources as the States agree to devote to these projects.*

FCP Category Descriptions

1. Improved Highway Design and Operation for Safety

Safety R&D addresses problems connected with the responsibilities of the Federal Highway Administration under the Highway Safety Act and includes investigation of appropriate design standards, roadside hardware, signing, and physical and scientific data for the formulation of improved safety regulations.

2. Reduction of Traffic Congestion and Improved Operational Efficiency

Traffic R&D is concerned with increasing the operational efficiency of existing highways by advancing technology, by improving designs for existing as well as new facilities, and by keeping the demand-capacity relationship in better balance through traffic management techniques such as bus and carpool preferential treatment, motorist information, and rerouting of traffic.

3. Environmental Considerations in Highway Design, Location, Construction, and Operation

Environmental R&D is directed toward identifying and evaluating highway elements which affect the quality of the human environment. The ultimate goals are reduction of adverse highway and traffic impacts, and protection and enhancement of the environment.

4. Improved Materials Utilization and Durability

Materials R&D is concerned with expanding the knowledge of materials properties and technology to fully utilize available naturally occurring materials, to develop extender or substitute materials for materials in short supply, and to devise procedures for converting industrial and other wastes into useful highway products. These activities are all directed toward the common goals of lowering the cost of highway construction and extending the period of maintenance-free operation.

5. Improved Design to Reduce Costs, Extend Life Expectancy, and Insure Structural Safety

Structural R&D is concerned with furthering the latest technological advances in structural designs, fabrication processes, and construction techniques, to provide safe, efficient highways at reasonable cost.

6. Prototype Development and Implementation of Research

This category is concerned with developing and transferring research and technology into practice, or, as it has been commonly identified, "technology transfer."

7. Improved Technology for Highway Maintenance

Maintenance R&D objectives include the development and application of new technology to improve management, to augment the utilization of resources, and to increase operational efficiency and safety in the maintenance of highway facilities.

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* The complete 7-volume official statement of the FCP is available from the National Technical Information Service (NTIS), Springfield, Virginia 22161 (Order No. PB 242057, price $45 postpaid). Single copies of the introductory volume are obtainable without charge from Program Analysis (HRD-2), Offices of Research and Development, Federal Highway Administration, Washington, D.C. 20590.

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